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HYDROLOGIC AND WATER-QUALITY APPRAISAL OF SOUTHEAST NASSAU COUNTY, LONG ISLAND, NEW YORK

By
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CONVERSION FACTORS AND ABBREVIATIONS

Multiply Inch-pound units	*by*	*To obtain Metric units*
inch (in)	25.4	millimeters (mm)
foot (ft)	0.3048	meter (m)
square foot (ft^2)	0.0929	square meter (m^2)
mile (mi)	1.6093	kilometers (km)
square mile (mi^2)	2.59	square kilometers (km^2)
gallon (gal)	0.0038	cubic meter (m^3)
acre	0.4047	square hectometer (hm^2)
ounce (oz)	28.35	grams (g)
pound (lb)	0.4535	kilogram (kg)
million gallons per day (Mgal/d)	3.8×10^3	cubic meters per day (m^3/d)
cubic foot per second per square mile [$(ft^3/sec)/mi^2$]	7.338	cubic meter per second per square hectometer [$(m^3/sec)/hm^2$]
"	0.0733	cubic meter per second per square kilometer [$(m^3/sec)/km^2$]
cubic foot per second (ft^3/s)	0.283	cubic meter per second (m^3/s)
gallons per minute (gal/min)	0.631	liters per second (L/s)
milligram per liter (mg/L)	--	--
micromhos per centimeter (μmho/cm)	--	--

HYDROLOGIC AND WATER-QUALITY APPRAISAL OF SOUTHEAST NASSAU COUNTY, LONG ISLAND, NEW YORK

By

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ABSTRACT

A regional sewerage system (Sewer District 3) under construction in southeast Nassau County is expected to cause changes in ground-water levels, ground-water quality, chemical quality of streamflow, and amount of streamflow. The changeover from individual cesspools and septic tanks to a regional sewer system in the 105-square-mile district will intercept millions of gallons of wastewater that would be returned to aquifers and will divert it to sewerage lines for treatment and discharge to the ocean. Sewerage will result in an improvement of general quality of ground water in the region by reducing the discharge of wastewater chemicals to the aquifer system.

Analog-model predictions indicate that after 20 years of sewer operation, ground-water levels will have declined a maximum of 16 feet just south of the 1977 ground-water divide. Similar declines have been observed in an adjacent sewer district (Sewer District 2), which has been sewered for more than 20 years. From 1975 to 1995, the average loss of water from ground-water storage in Sewer District 3 is predicted to be 14.1×10^9 gallons.

Forty-five water-table wells in Sewer District 3 were sampled from three to 12 times a year from 1974-77 to determine general water quality and its seasonal variations. In the central part of Sewer District 3, nitrate (as nitrogen) concentration generally exceeded 10 milligrams per liter. Where the unsaturated zone exceeded 30 feet in thickness, almost all nitrogen species in ground water were in the form of nitrate. Ammonium concentration was higher in the southern part of the area, where the unsaturated zone is thinner. In the southern part of an adjacent sewered area (Sewer District 2), the average median concentration of ammonium (as nitrogen) was approximately 0.1 mg/L, whereas in the southern part of Sewer District 3 it was 1.8 mg/L. The average median concentration of dissolved oxygen in ground water in Sewer District 3 was 2.4 mg/L, whereas in Sewer District 2 it was 4.3 mg/L. Interception of sewage by sewers is considered to be the principal reason for the higher dissolved oxygen concentrations in Sewer District 2.

Sewerage has significantly affected streamflow in Sewer District 2, and similar changes are expected in Sewer District 3 after completion of sewerage. Analog-model predictions show an average reduction of 60 percent in annual streamflow in Sewer District 3 after 20 years of sewer operation.

Median nitrate (as nitrogen) concentration of the streamflow in Sewer District 3 was 6.6 mg/L, whereas in the sewered area it was 1.7 mg/L.

INTRODUCTION

Ground water is the sole source of fresh water for the nearly 2.8 million inhabitants of Nassau and Suffolk Counties on Long Island, N.Y. Population in Nassau County increased from approximately 55,000 in 1900 to over 1,400,000 in 1975 (Nassau County Planning Commission, written commun., 1977). In recent years, the rapidly increasing demand for fresh water as a result of continued suburban growth, and the consequent increase in the amount of wastewater discharged through cesspools and septic tanks to the ground-water reservoir, have altered the chemical quality of the ground water.

In recent decades, sewer systems have been installed on Long Island to prevent further alteration of ground-water quality by cesspool and septic-tank effluents and to replace old or poorly functioning cesspool and septic-tank systems. Large communal sewer systems have been constructed in southwest Nassau County and are now being constructed in southeast Nassau County. These systems terminate in wastewater-treatment plants that discharge the treated effluents to tidewater or the ocean.

The area studied in this investigation from 1974-77 is known locally as Sewer District 3. It occupies a highly suburbanized area in the southeast part of Nassau County (fig. 1) and covers about 105 mi^2. Water for domestic and industrial use within Sewer District 3 is derived from aquifers. Fifteen major water districts within Sewer District 3 supply approximately 1.9×10^{10} gallons of water per year to a population of 580,000.

Most sewage is disposed of through individual cesspools or septic tanks to the water-table aquifer, where it tends to alter the quality of ground water (Perlmutter and Koch, 1972, and Ku and Sulam, 1976) by introducing nitrate and other sewage-related constituents.

A regional sewerage system is being installed within Sewer District 3 to reduce the amount of cesspool and septic-tank effluents that enter the aquifer and to thereby prevent further contamination. Sewage from District 3 will be routed to the Cedar Creek Pollution Control Plant (fig. 1), where it will be treated and discharged to the ocean.

Purpose and Scope

Changes in the hydrologic regimen that result from regional sewerage have been noted in parts of Nassau County since 1968. To define these changes in detail, the U.S. Geological Survey, in cooperation with the Nassau County Department of Public Works, collected and studied hydrologic and water-quality data in an unsewered area (Sewer District 3) during 1974-77 to determine conditions that prevailed before sewer operation. The information thus obtained provides a basis from which the hydrologic changes resulting from future sewerage can be compared and analyzed.

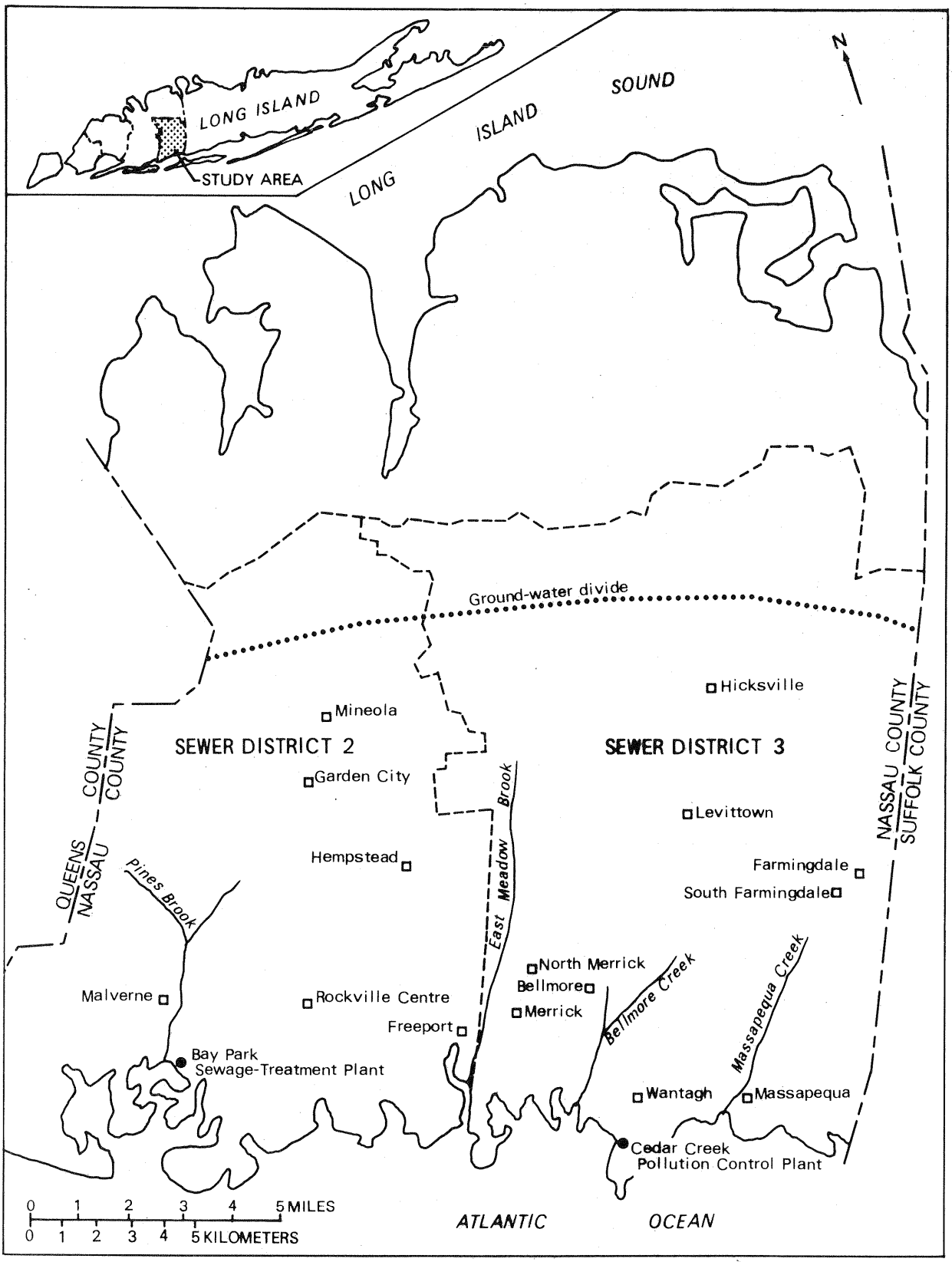


Figure 1.--Location of Nassau County Sewer Districts 2 and 3, sewage-treatment plants, and selected villages and streams.

To adequately depict hydrologic and water-quality conditions within Sewer District 3 before sewerage, 1974-77 data on population, precipitation, water quality, ground water, pumpage, and surface water were collected. These data are compiled in this report and, where appropriate, are supplemented by information collected during previous studies. In addition, this report (1) discusses long-term fluctuations in ground-water levels and water-quality trends in the upper glacial aquifer and the underlying Magothy aquifer, and (2) compares hydrologic conditions and ground-water quality in the unsewered area (Sewer District 3) with those in the adjacent sewered area (Sewer District 2).

Sewerage History and Plans

The percentage of Nassau County's population served by sewers increased from 8 percent in 1940 to 54 percent in 1970. Approximately 98 percent of Nassau County's population will be served by sewers after installation and completion of sewers in Sewer District 3. This work is scheduled for completion in 1985.

As of 1977, the largest sewer district in Nassau County was Sewer District 2 (fig. 1), which services an area of approximately 70 mi^2 and a population of approximately 580,000. Before completion of the sewage-treatment plant at Bay Park in 1953, all domestic and industrial waste was discharged into the ground from individual systems, except in the villages of Hempstead, Garden City, Rockville Centre, and Mineola, which had communal sewerage systems and treatment plants. Effluent from these plants was discharged into the ground also, however. Hookups to the Sewer District 2 sewage-treatment plant at Bay Park were virtually completed by 1964, and, at present, this plant treats and discharges about 60 Mgal/d of sewage to tidewater.

Initial planning for communal sewers in Sewer District 3 began in 1964 in response to (1) increasing commercial and industrial development, (2) the need to protect the ground-water reservoir from further contamination, and (3) the increased failure of private sewage-disposal units. The treatment plant in Sewer District 3 is an activated-sludge type with an average design flow of 45 Mgal/d. Effluent from this plant is discharged to the ocean, and digested sludge is pumped to the Sewer District 2 plant for ocean disposal.

Acknowledgments

The authors are grateful to the Nassau County Department of Public Works, particularly to H. John Plock, Jr., former Commissioner, James S. Gillen, Deputy Commissioner, and Francis J. Flood, Superintendent of Sanitary Engineering, whose cooperation was essential for successful completion of the project. Also provided by the Department of Public Works were numerous chemical analyses, made by Louis S. Guaracini, chemist, under the direct supervision of James A. Oliva, Sanitary Engineer. The Nassau County Department of Public Works, Division of Sanitation and Water Supply, under the

supervision of Francis Bladykas and Charles Kirshner, installed several new observation wells and replaced some old ones to facilitate water sampling for chemical analysis.

Donald H. Myott, Public Health Engineer of the Nassau County Department of Health, provided water-quality data from public-supply wells. Abraham Groopman, Assistant Commissioner, Environmental Protection Administration, New York City, provided hydrologic data on infiltration galleries in Nassau County.

HYDROLOGIC SETTING

The geologic and hydrologic properties of the aquifers on Long Island have been described in numerous reports. Perlmutter and Geraghty (1963) and Ku and others (1975) described the geology of the study area, and McClymonds and Franke (1972) reported on water-transmitting properties of the aquifers.

A generalized section of the hydrologic units in the study area is shown in figure 2. The bedrock in the area does not store or transmit significant quantities of water and is thus considered to be the base of the ground-water reservoir. Overlying the bedrock is a southward-dipping mass of unconsolidated deposits that constitute the ground-water reservoir. Table 1 describes the characteristics of the water-bearing units. The major aquifers on Long Island are the upper glacial and Magothy aquifers.

In southern Nassau County, the glacial deposits are estimated to average 50 ft in thickness (McClymonds and Franke, 1972). In most of the northern part of Sewer District 3, the water table is below the glacial deposits (McClymonds and Franke, 1972). Average horizontal hydraulic conductivity of the upper glacial aquifer within the study area is 250 ft/day. This value is among the highest on Long Island and is typical of outwash-plain deposits. Nevertheless, average transmissivity of the upper glacial aquifer (12,700 ft^2/day) is low, owing to the relative thinness of the aquifer.

The Magothy aquifer averages 600 ft in thickness but increases to a thickness of 800 ft toward the southern part of Sewer District 3. Average horizontal hydraulic conductivity of the Magothy aquifer is 56 ft/day (McClymonds and Franke, 1972), but, in the northwest part of the study area, it may be as much as 67 ft/day. Average transmissivity of the Magothy aquifer is 33,600 ft^2/day and increases southward owing to the increased aquifer thickness.

The vertical hydraulic conductivity of the aquifers is considerably less than the horizontal hydraulic conductivity. Getzen (1977) estimated that the ratio of vertical hydraulic conductivity to horizontal conductivity in the upper glacial aquifer ranges from 1:10 to 1:24 and that in the Magothy aquifer, the ratio ranges from 1:30 to 1:60.

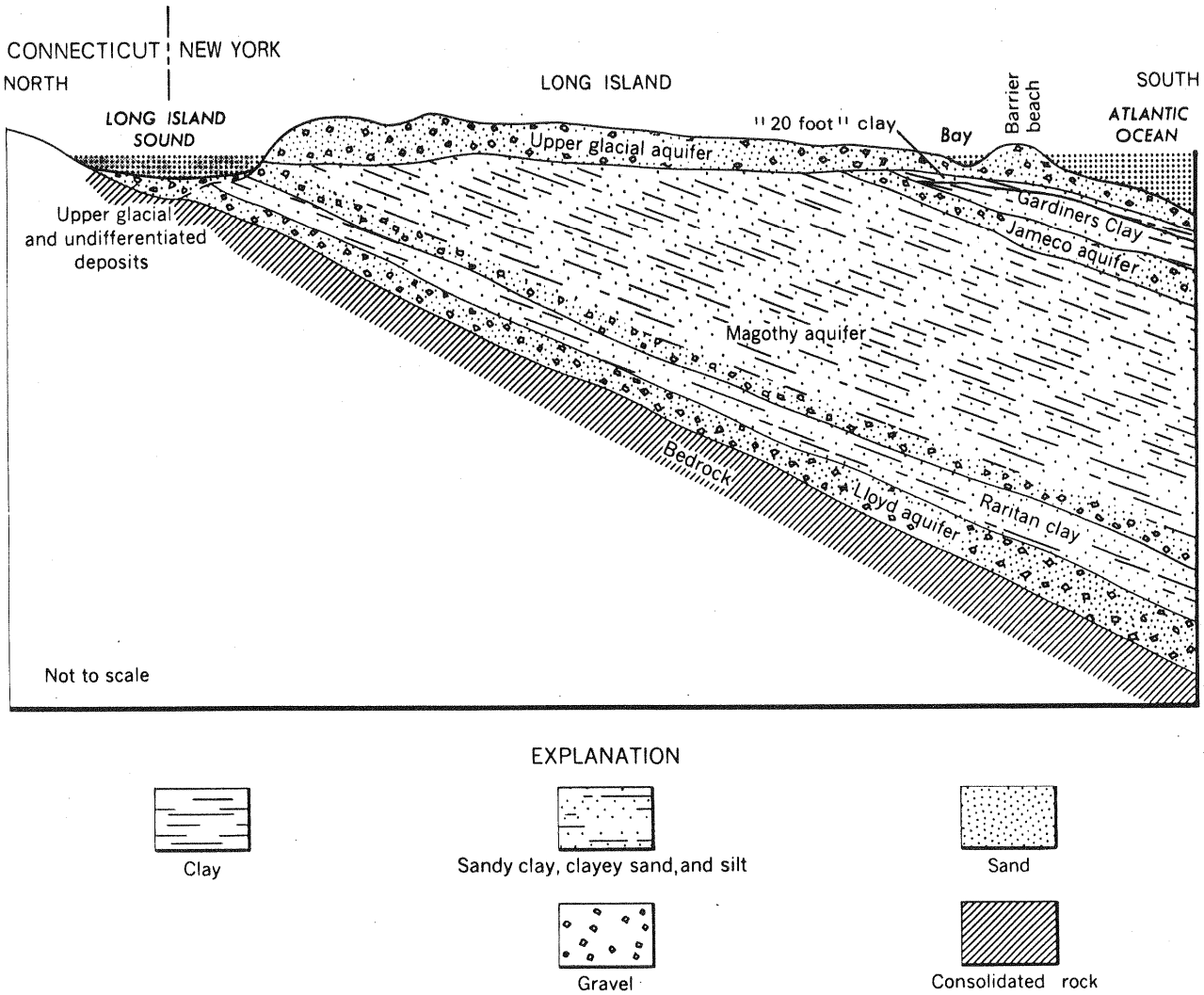


Figure 2.--Generalized section of aquifer systems on Long Island. (From Cohen and others, 1968).

Table 1.--Generalized description of hydrogeologic units underlying southeast part of Nassau County[1]

Hydrogeologic unit	Water-bearing character
QUATERNARY	
Upper glacial aquifer	Mainly sand and gravel of moderate to high permeability; also includes clayey deposits of till of low permeability.
"20-foot" clay	Relatively impermeable confining unit.
Gardiners clay	Clay, silty clay, and a little fine sand of low to very low permeability.
Jameco aquifer	Mainly medium to coarse sand of moderate to high permeability.
CRETACEOUS	
Magothy aquifer	Coarse to fine sand of moderate permeability; locally contains gravel of high permeability, and abundant silt and clay of low to very low permeability.
Raritan clay	Clay of very low permeability; some silt and fine sand of low permeability.
Lloyd aquifer	Sand and gravel of moderate permeability; some clayey material of low permeability.

1 Modified from Cohen and others, 1968.

Ground-water/Surface-water Relationship

Along the south shore of Long Island, streams and the water table are hydraulically connected because of the high hydraulic conductivity of the upper glacial aquifer. Streams act as ground-water drains and reduce hydrostatic head in the aquifer adjacent to the stream channels. Ground water flows toward and into streams as a result of the hydraulic gradient between the aquifer and stream. This relationship is depicted as a graph in figure 3, in which data from Franke and McClymonds (1972) have been extended through 1975. In figure 3, the effects of the regional drought that began in 1962 are shown as water-level declines that persisted until 1967, when water levels began to recover. Stream discharge displayed similar effects during that period.

Figure 4, which shows monthly ground-water levels and stream discharges averaged from 1951-75 at selected wells and streams in Sewer District 3 illustrates seasonal variation of ground-water level and streamflow. The curves indicate that water levels and streamflow are highest from March to May and lowest in September and October. The ratio of maximum to minimum average monthly discharge of streams represented is approximately 1.5:1; however, this ratio ranges from 1.2:1 to 2:1 in individual streams on Long Island (Franke and McClymonds, 1972, p. F29). This variation is small in comparison with that of most streams elsewhere and reflects the well-sustained ground-water discharge to streams and the absence of appreciable storm runoff.

Figure 5 (p. 11) shows the relationship between ground-water level and stream discharge. A graphical line of best fit was drawn between the data points to represent the general relationship. The wide scatter of plotted points is due mainly to seasonal differences in the rate of evapotranspiration from the land surface, soil zone, and zone of saturation near the stream channel. In the absence of, or a decrease in, active evapotranspiration, additional ground water would seep into stream channels and increase the amount of streamflow.

Deviations from the graphical line of best fit indicate that whatever the ground-water altitude, streamflow tends to be greater in cool months (mainly February and March), when evapotranspiration is low, than in warm months (July and August), when evapotranspiration is high.

The planned conversion from cesspool and septic-tank systems to the regional sewerage system will cause regional declines in ground-water levels by preventing wastewater from being returned to the aquifer. This, in turn, will reduce the amount of ground water discharged into streams.

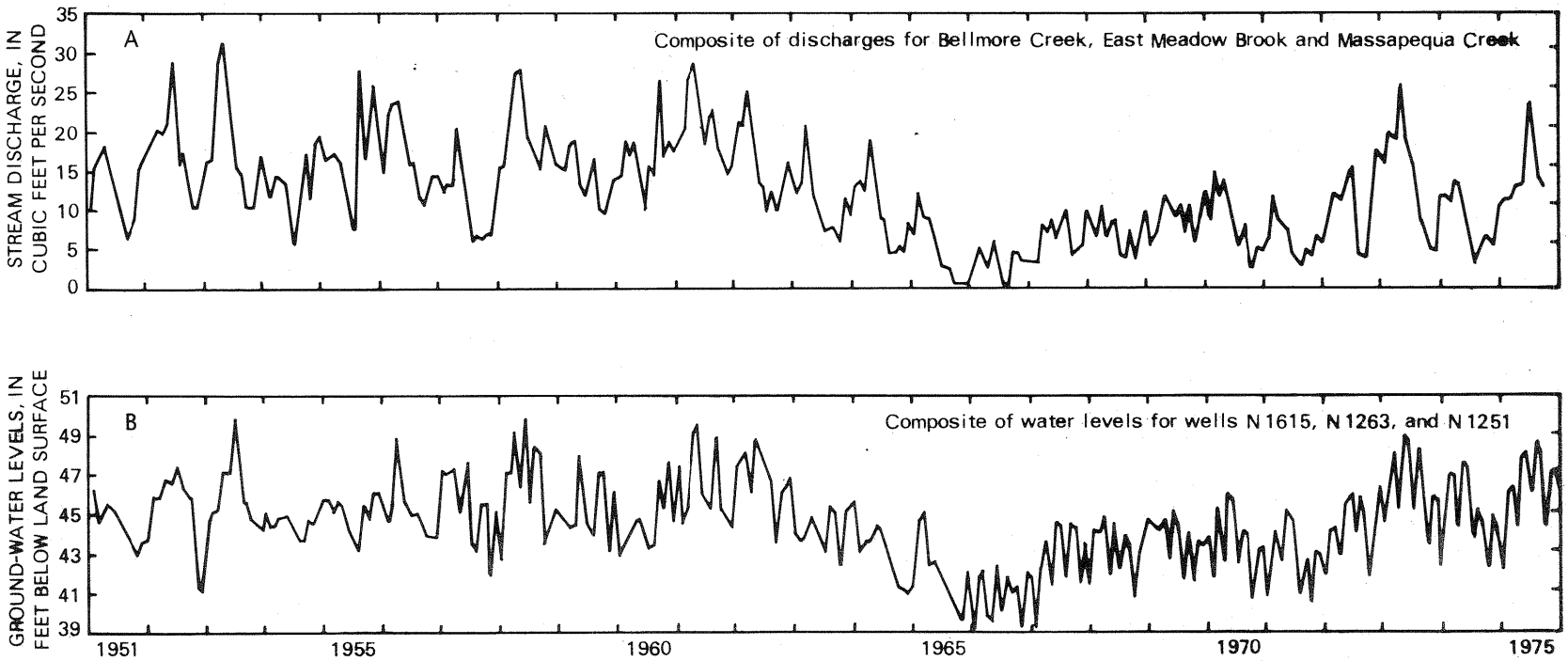


Figure 3.--(A) Average monthly discharge of selected streams in Sewer District 3, 1951-75; (B) average monthly water levels in nearby wells.

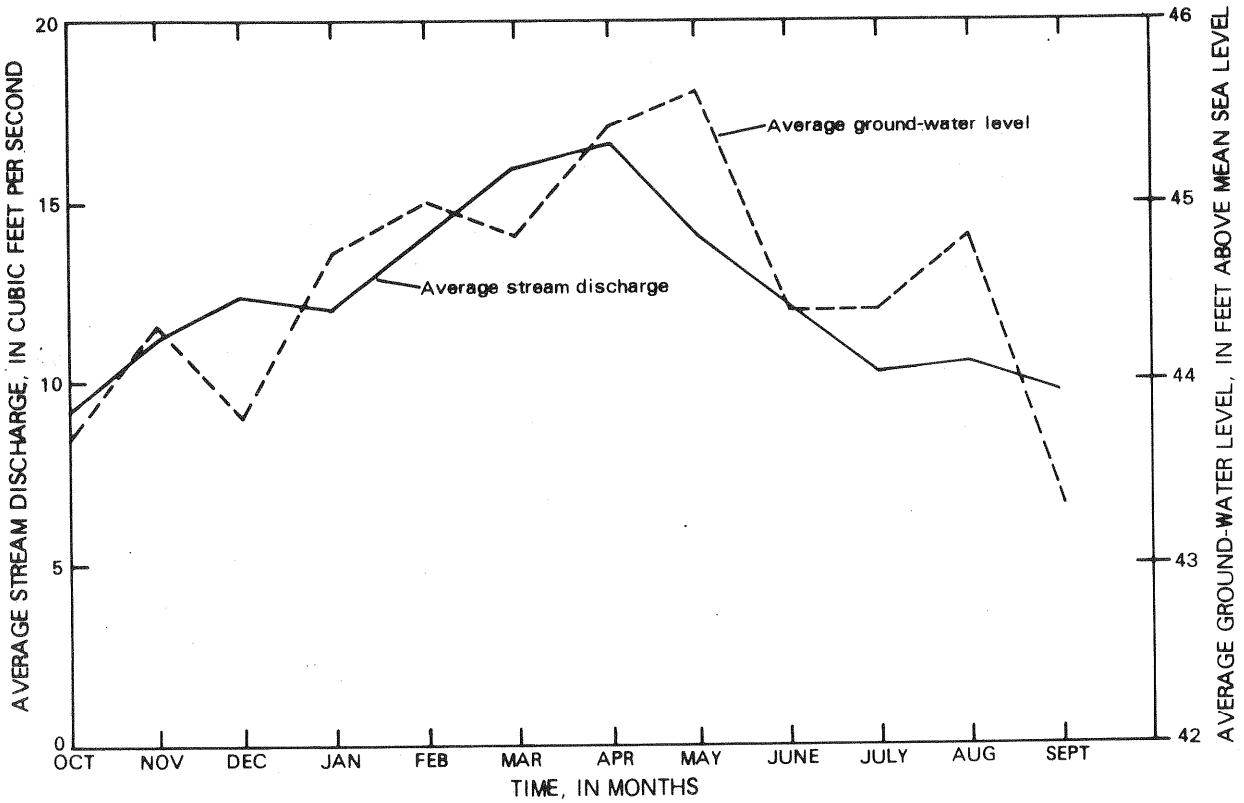


Figure 4.--Average monthly discharge of selected streams in Sewer District 3 and water levels in nearby wells. (Based on records from 1951-75.)

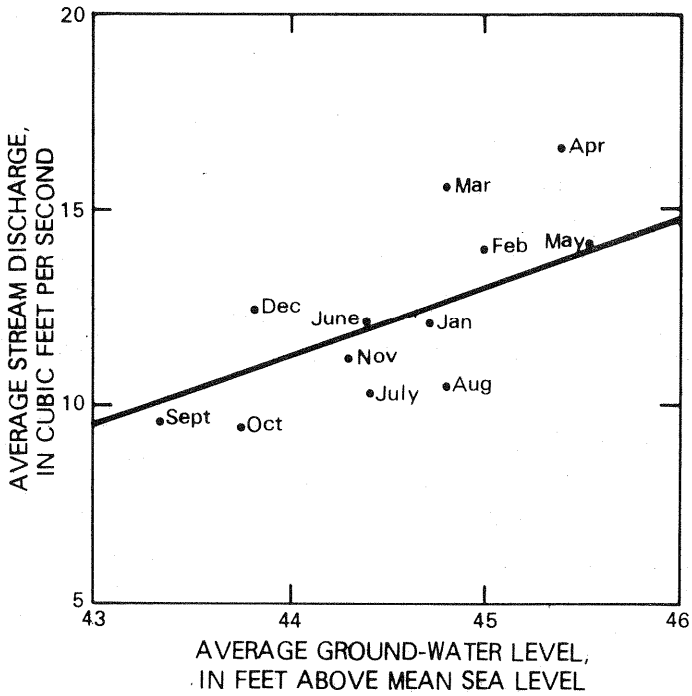


Figure 5.--Relation of discharge of selected streams in Sewer District 3 to water levels in nearby wells. (Data points represent monthly average during 1951-75.)

Precipitation

Precipitation is the sole source of natural fresh-water recharge on Long Island. During the winter, most precipitation on Long Island is caused by low-pressure systems that originate in the Gulf of Mexico and in the southwest part of the North Atlantic Ocean and move northeastward along the Atlantic Coast. During the summer, most precipitation is associated with thunderstorms, either local or initiated by the passage of cold fronts. A detailed study of the precipitation regime of Long Island is given in Miller and Frederick (1969).

The long-term average (1947 to 1975) annual precipitation at Freeport, Nassau County, is 40.93 in. (fig. 6). However, the amount of precipitation varies considerably from year to year. For example, annual precipitation since 1947 ranged from 24.56 in. in 1965 to 51.58 in. in 1975. A bar graph of annual precipitation at the Freeport gage is shown in figure 6.

Figure 7 shows the long-term annual precipitation distribution in the study area, as described by Miller and Frederick (1969). This map

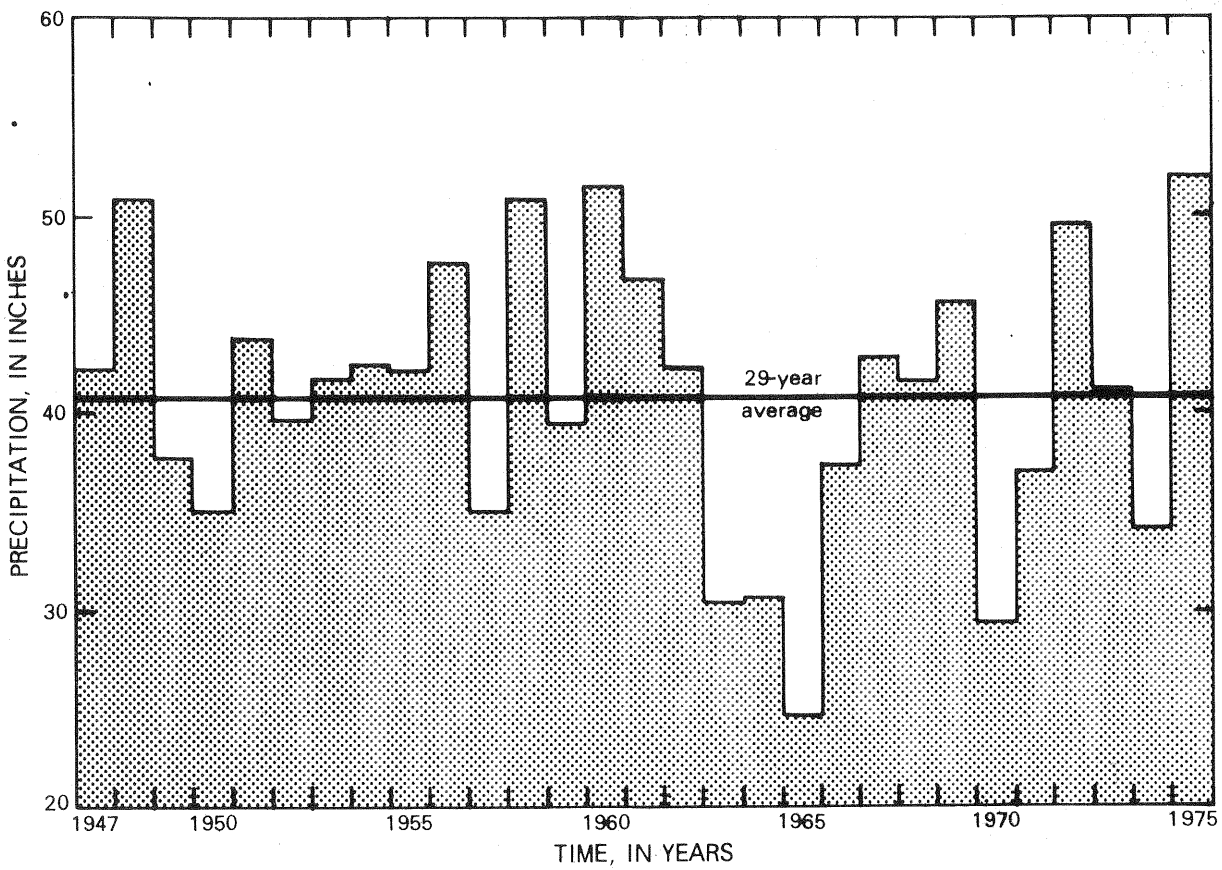


Figure 6.--Annual precipitation at Freeport, 1947-75.

represents a 15-year period of record, which is of sufficient length to provide precipitation averages that compare favorably with the average for the climatologic normal period of 30 years, in accordance with the standards of the World Meteorological Organization.

Twelve rain gages were operated in and around the study area during 1974-77 to determine the areal distribution of local precipitation. The data were used to prepare maps showing precipitation patterns during a cool season (October 1975 to March 1976), a warm season (April 1976 to September 1976), and a water year (October 1975 to September 1976). (See figs. 8A-8C, p. 14-16.) The report by Miller and Frederick (1969) was used as a guide in drawing the lines of equal precipitation.

Precipitation during water year 1976 was nearly equivalent to the average long-term precipitation measured at the Freeport gage, and the areal distribution was similar to the long-term pattern, as determined by Miller and Frederick (1969), except that a large amount was recorded at the Bellmore gage from April to September.

In general, precipitation increases from the south shore to the higher elevations at the center of Long Island.

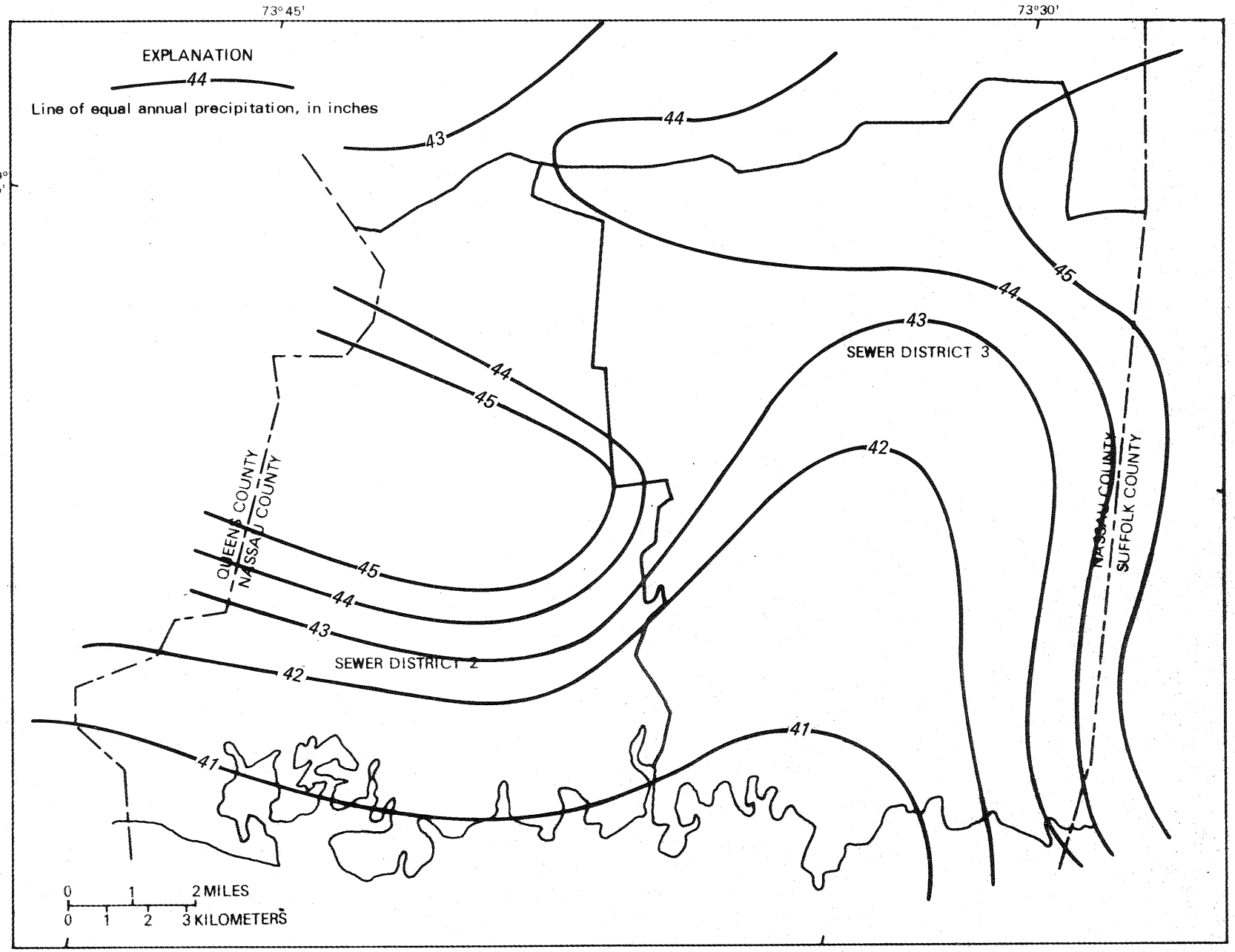


Figure 7.--Mean annual precipitation in Nassau County, 1951-65. (Modified from Miller and Frederick, 1969.)

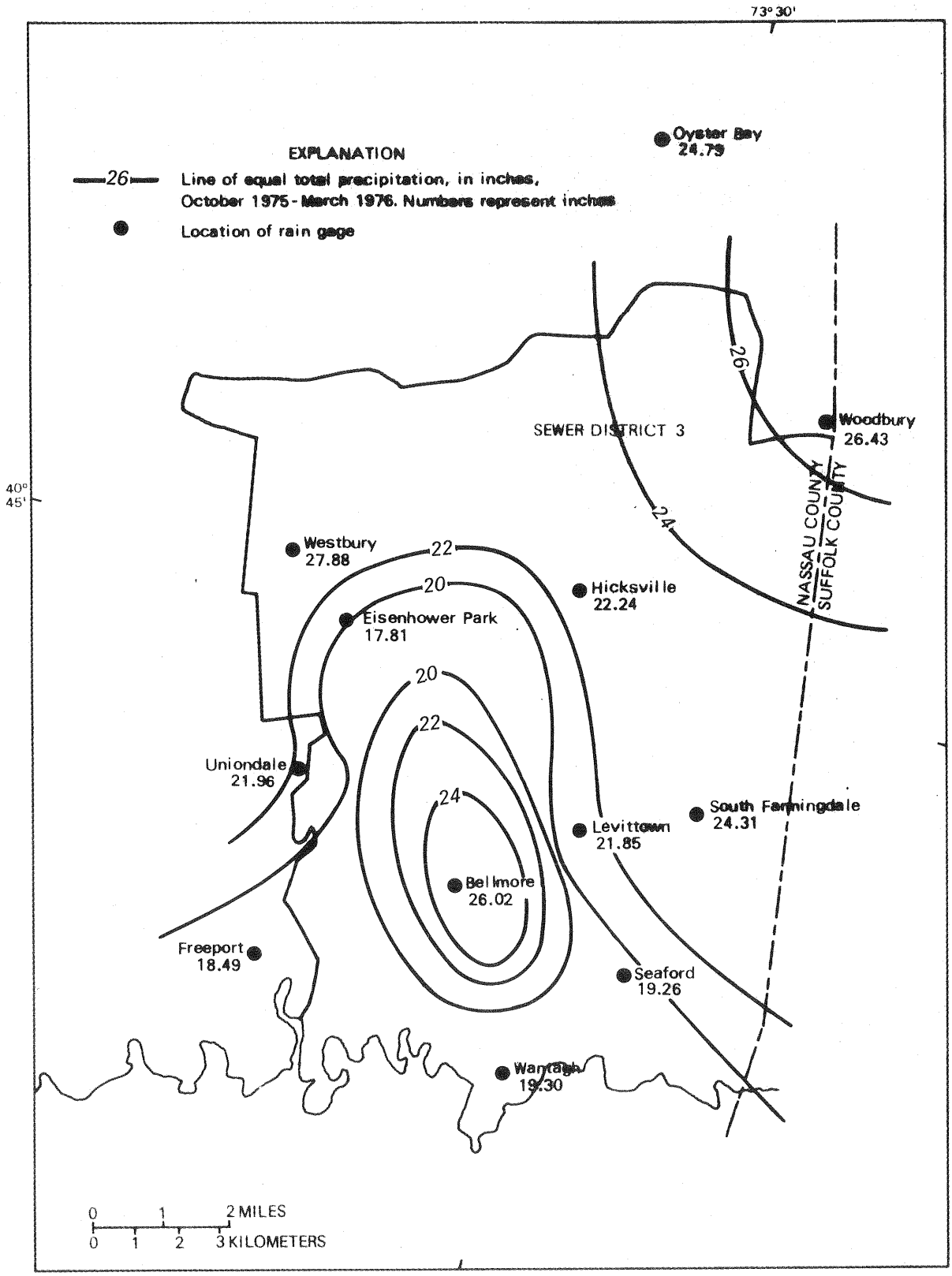


Figure 8A.--Areal distribution of total precipitation in Sewer District 3 during cool season, October 1975 to March 1976.

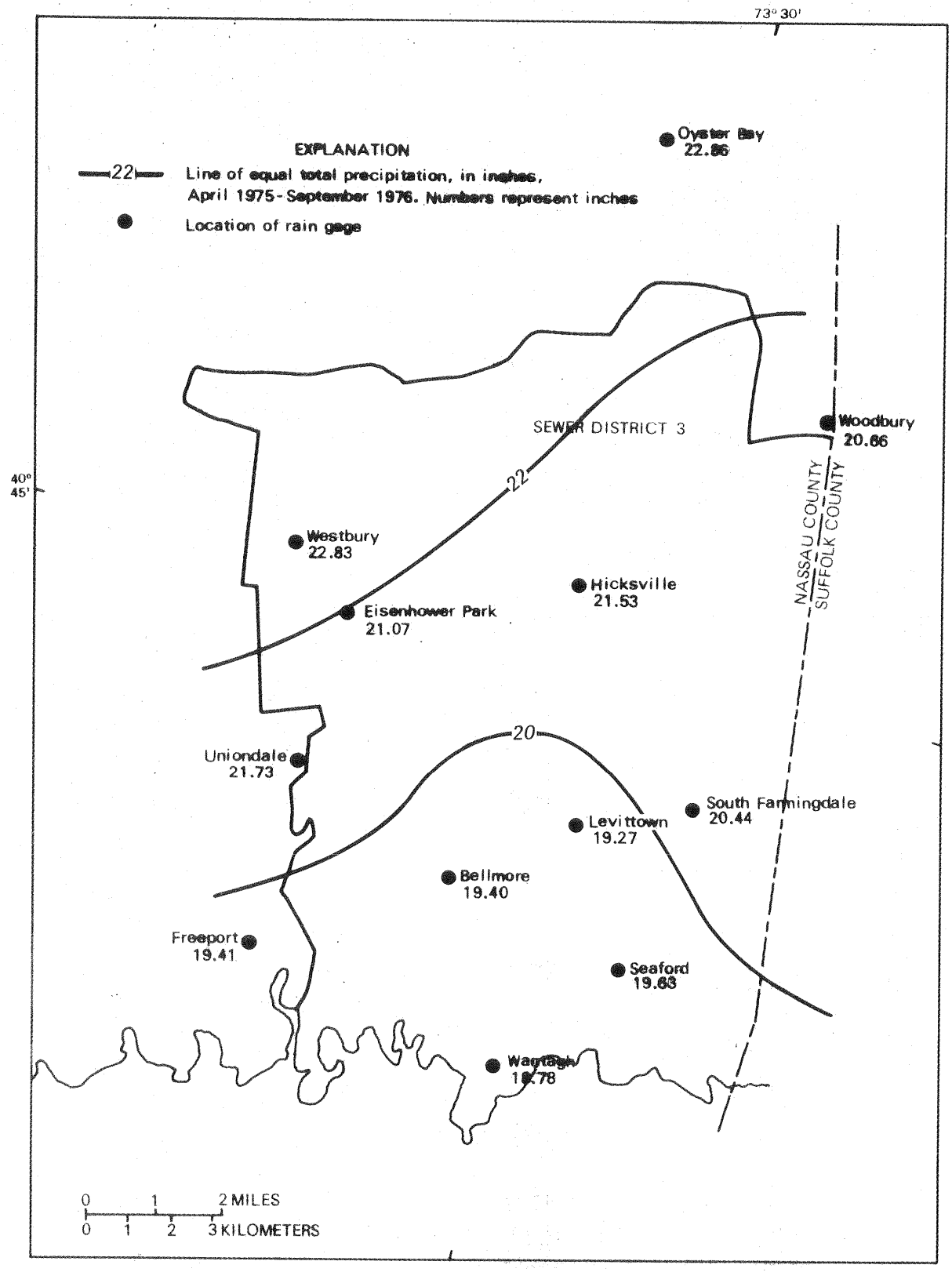


Figure 8B.--Areal distribution of total precipitation in Sewer District 3 during warm season, April to September 1976.

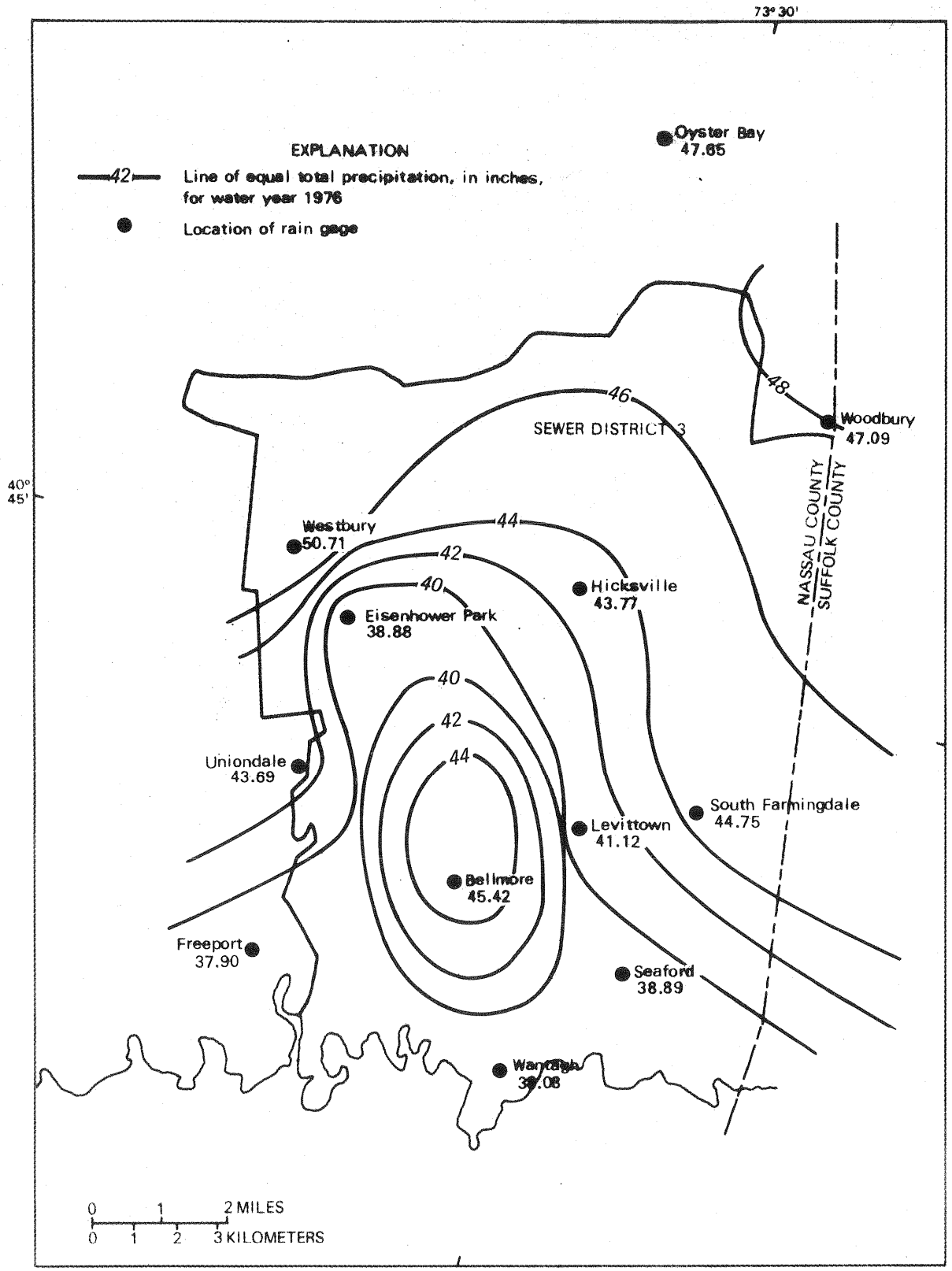


Figure 8C.--Areal distribution of total precipitation in Sewer District 3 during water year 1976.

GROUND WATER

Water-Level Changes

A network of shallow observation wells has been installed and maintained throughout Nassau County by the Nassau County Department of Public Works, Division of Sanitation and Water Supply, to monitor ground-water levels. These wells were used extensively during this study.

Ten well lines (locations shown in fig. 9), each consisting of four or five wells, were used to define water-table fluctuations in the study area. Hydrographs of these well lines are shown in figure 10. Well lines 1, 3, 5, 7, and 9 represent wells in which water-table altitudes were 50 feet or more above mean sea level; well lines 2, 4, 6, 8, and 10 represent wells in which water levels were less than 50 ft above mean sea level. The latter wells are near the south-shore bays and therefore fluctuate less than others in response to stress placed on water-levels because the bays act as a constant head boundary.

Between 1950 and 1962, average water levels in all wells in each well line were generally near or above the long-term average. However, from 1963 to 1967, water levels declined steadily. Most of the water-level declines resulted from below-average precipitation during the 1962-66 drought on Long Island (Cohen and others, 1969). After 1967, water levels began to recover and by 1975 were virtually at predrought levels.

Effects of sewerage on ground-water levels in Sewer District 2, directly west of the study area, were analyzed by Garber and Sulam (1976). Their study indicates that after the installation of sewers in 1953, water levels in Sewer District 2 declined in relation to water levels in Sewer District 3 and that declines in Sewer District 2 ranged from 5.1 ft to 23.7 ft at individual well-line locations (Garber and Sulam, 1976). Most of the water-level decline in Sewer District 2 was attributed to sewerage and ground-water withdrawals in adjacent Queens County. Because hydrogeologic conditions in both sewer districts are similar, water-level declines are also expected in Sewer District 3 after completion of hookups to the regional sewerage system.

Ku and others (1977), with the aid of an analog model, predicted that sewerage in Sewer District 3 would cause water-table declines and that the maximum decline would be directly south of the present ground-water divide (fig. 11). By 1995, after 20 years of sewer operation, this decline should cause the ground-water divide to shift northward. If the divide moves as expected, water in the area between the two locations will no longer flow north from the location of the present divide but will be reversed and flow south from the new divide.

The maximum decline from sewerage in the study area is predicted by analog-model simulation to be little more than 16 ft and to be concentrated in a small area directly south of the present ground-water divide. This applies both to the upper glacial and the Magothy aquifers. The predicted net decline of 16 ft agrees with measurements made by Franke (1968) and Garber and Sulam (1976) in Sewer District 2, west of the study area.

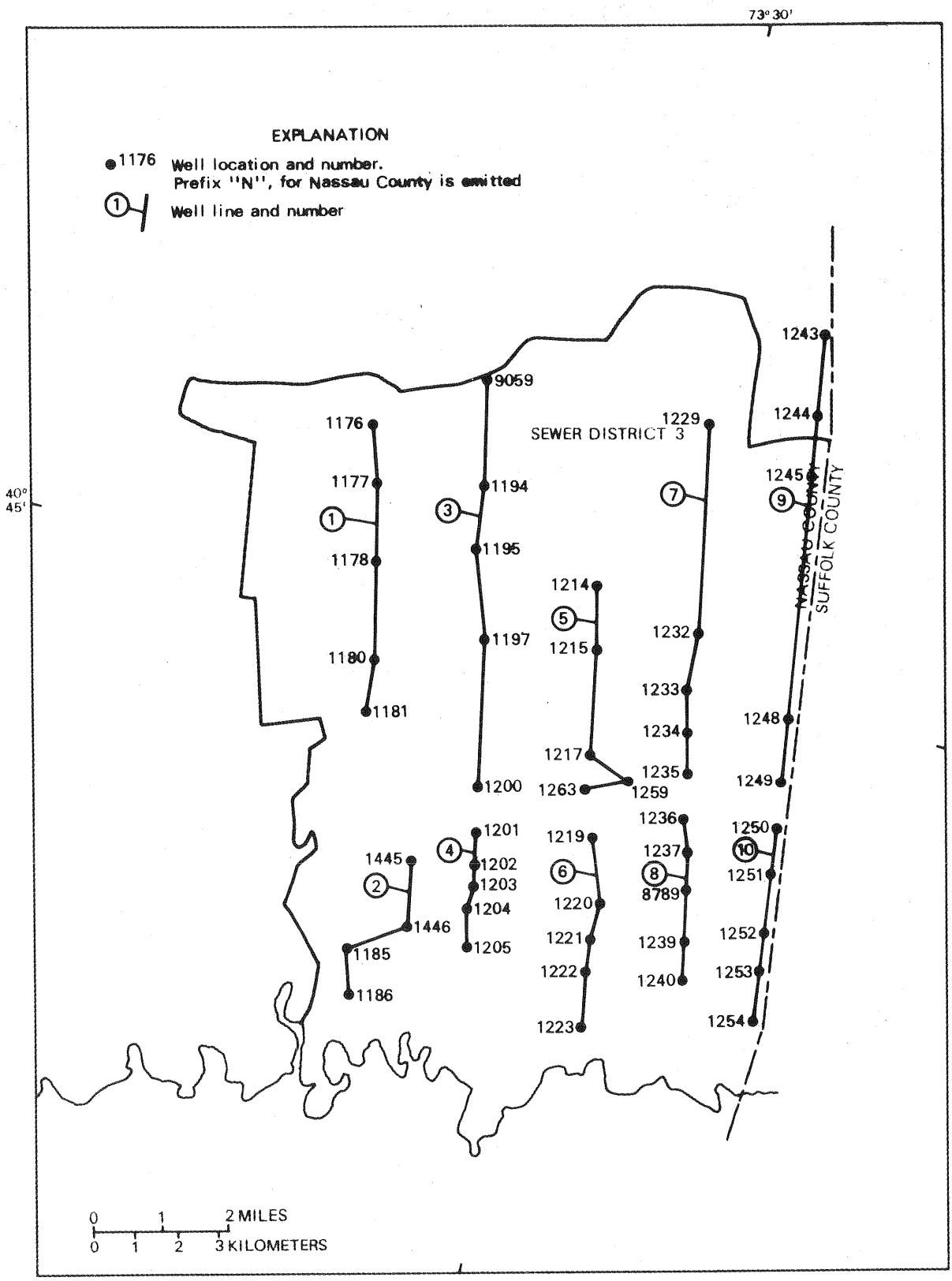


Figure 9.--Location of well lines used to define water-table fluctuations in Sewer District 3.

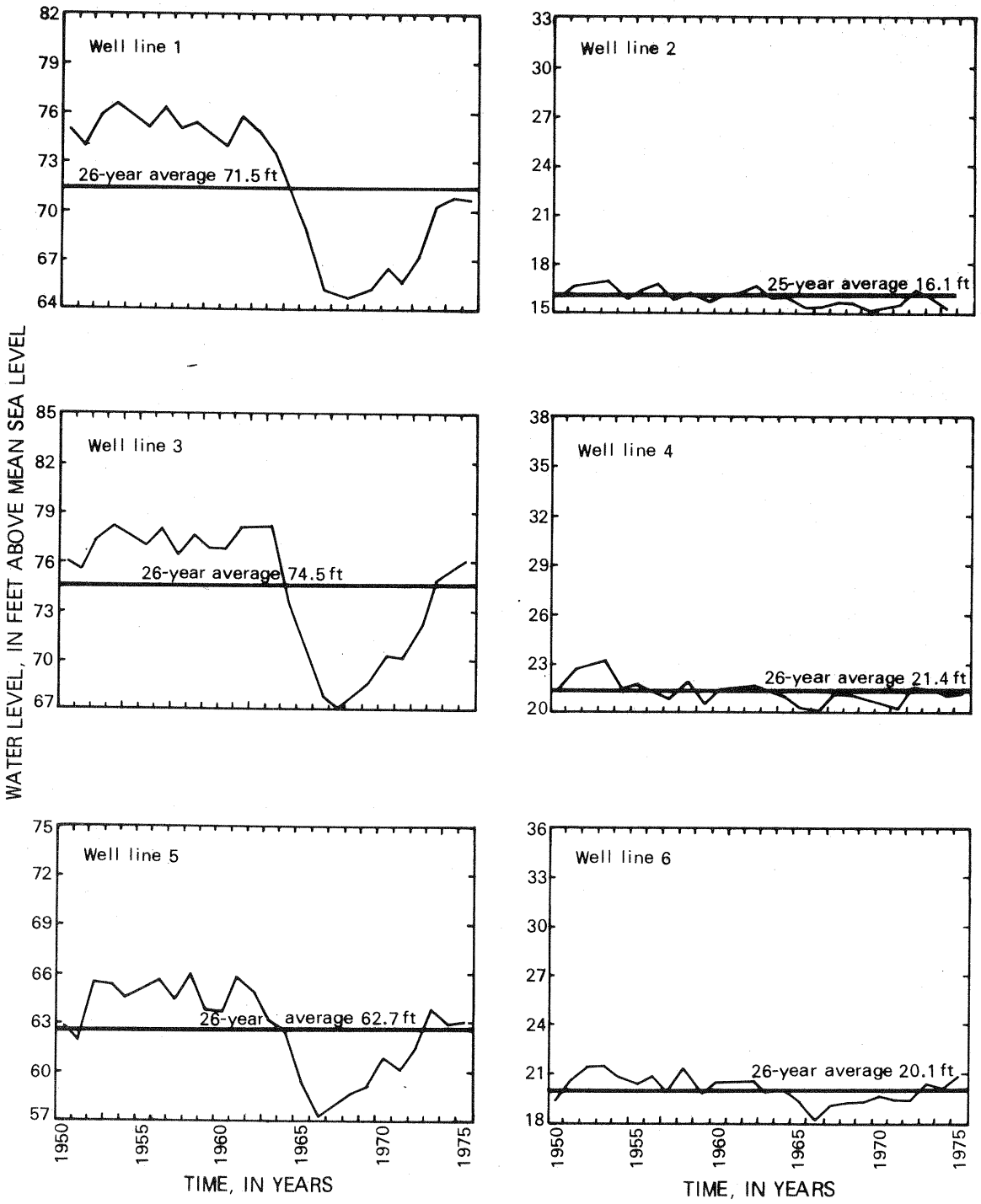


Figure 10.--Average annual water levels during 1950-75 at 10 well lines in Sewer District 3.

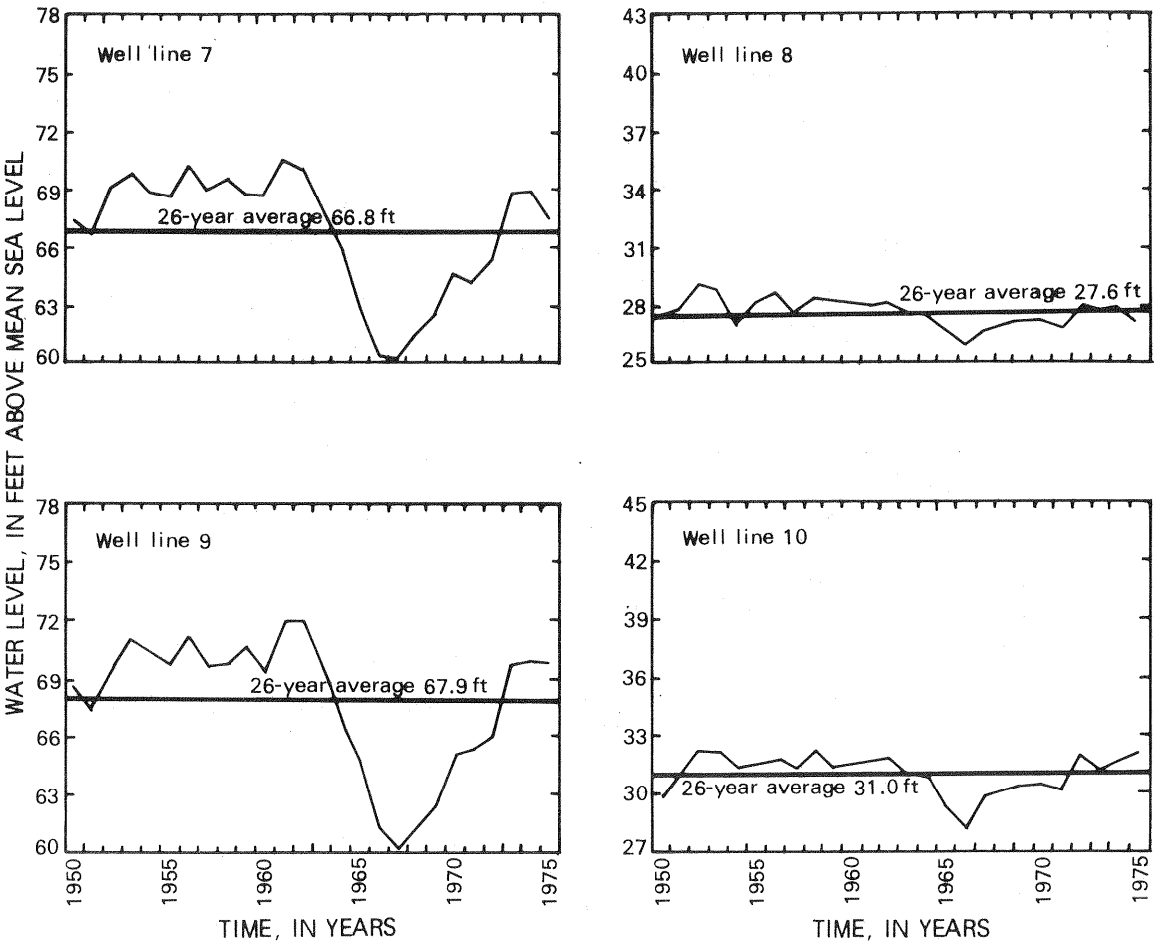


Figure 10 (continued).--Average annual water levels during 1950-75 at 10 well lines in Sewer District 3.

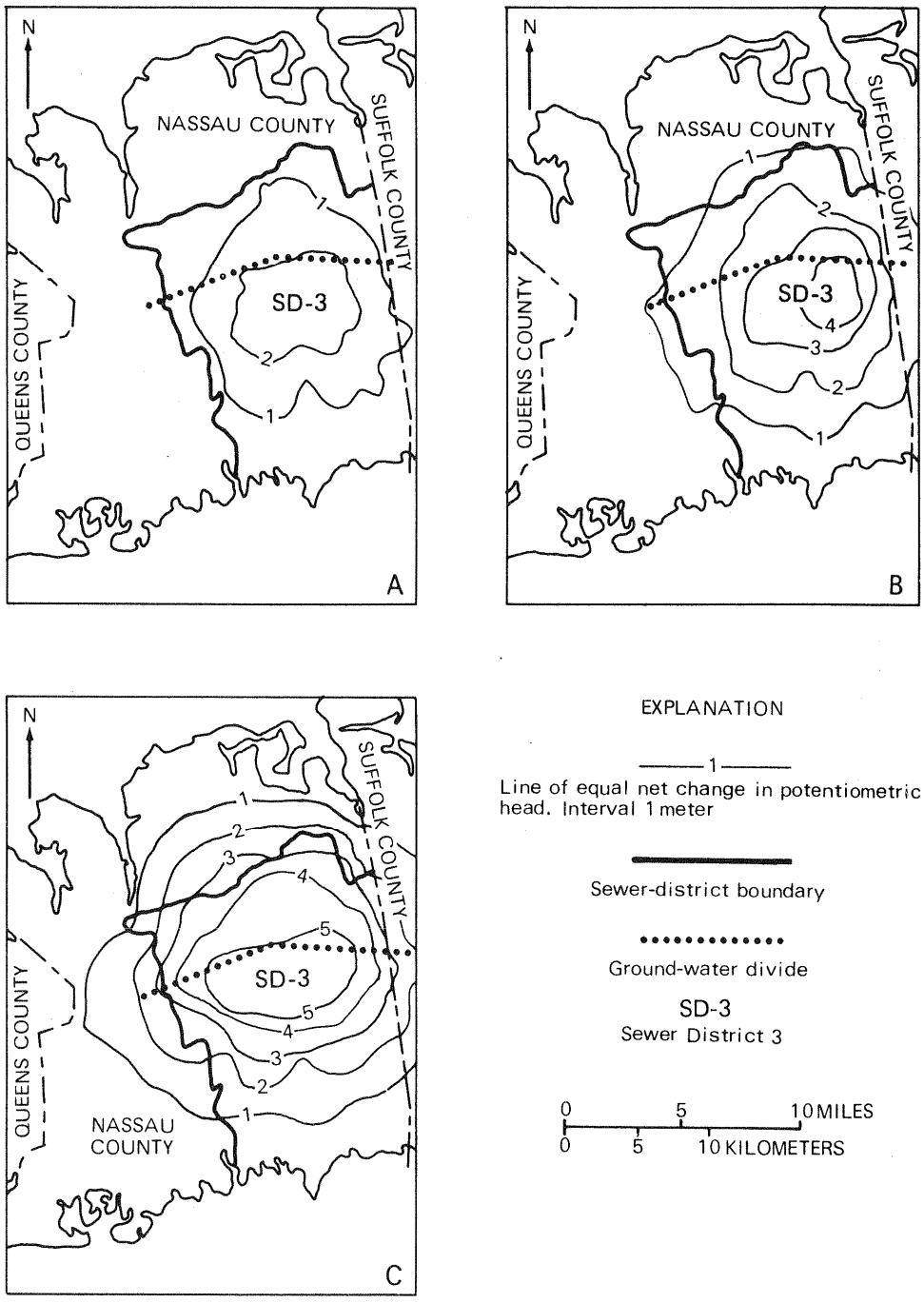


Figure 11.--Predicted water-table decline in Nassau County Sewer District 3: (A) after 6 years of sewer operation (1981); (B) after 10 years of sewer operation (1985); and (C) after 20 years of sewer operation (1995). (From Ku and others, 1977.)

The loss of ground water from storage in Sewer District 3 by 1995, as determined from an assumed 20-percent specific yield from the upper glacial aquifer and a computed average water-level decline of 3.7 ft across Sewer District 3, is estimated to be 14.6×10^9 gal or 0.73×10^9 gal/yr.

The regional drought of 1962-66, the most severe on record for Long Island, caused water levels in Sewer District 3 to decline a maximum of 10 ft. The net decline of water levels in the upper glacial aquifer across Long Island during the drought is depicted in figure 12; the average decline within Sewer District 3 during that period was 6 ft. In Nassau and Suffolk Counties combined, the amount of ground water lost from storage during that period is estimated to be 155×10^9 gal (Cohen and others, 1969, p. F16); in Sewer District 3, the estimated loss was 26.3×10^9 gal or 5.26×10^9 gal/yr. Therefore, the amount of ground water lost from storage in Sewer District 3 during the drought was approximately twice the loss expected by 1995, after 20 years of sewerage. However, water was lost from storage during the drought years at a rate 700 percent greater than the rate expected to result from sewerage. Thus, the amount of ground water expected to be lost through sewerage is small compared with the amount lost during the drought of 1962-66.

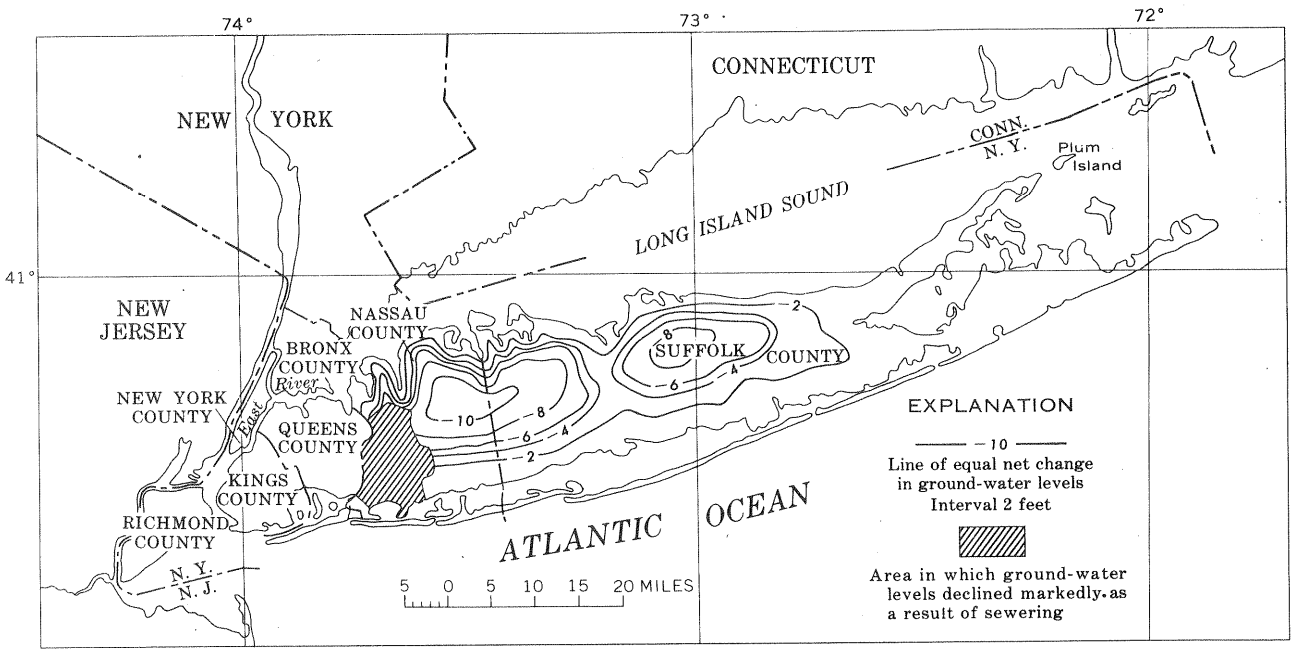


Figure 12.--Net change of water levels in the upper glacial (water-table) aquifer during 1962-66 drought. (From Cohen and others, 1969.)

Water Quality

The chemical quality of ground water in Sewer District 3 has been described by DeLuca and others (1965), Perlmutter and Koch (1972), Smith and Baier (1969), and more recently Ku and Sulam (1976) and Sulam and Ku (1977); basic data on water quality in Nassau and Suffolk Counties are compiled in Ragone and others (1976).

The water quality of the study area is described by aquifer--the shallow water-table aquifer and the deeper Magothy. The chemical quality of water from the Magothy aquifer, in which most public-supply wells are screened, is monitored by the Nassau County Department of Health as well as by individual water companies. (See section "Public-Supply Wells," p. 47). Water quality in the water-table aquifer is monitored by the U.S. Geological Survey, in cooperation with Nassau County Department of Public Works. Analyses of the chemical quality of drinking water from both agencies are on file at the Nassau County Department of Health.

Nitrogen

Nitrate is of principal concern in Nassau County because high nitrate concentrations in drinking water have been correlated with the disease methemoglobinemia (blue-baby disease), which affects mostly infants. Nitrate enters the aquifer chiefly from infiltration of sewage and fertilizers and from leachates at solid-waste-disposal sites. Perlmutter and Koch (1972) adduced that nitrate concentrations in excess of 1 mg/L of nitrate (NO_3^-) or 0.23 mg/L of nitrate (as N) indicated the presence of human waste products. An example of an area in which ground water in the shallow (water-table) aquifer has become contaminated as a result of rapid population growth is a part of Levittown, where local nitrate concentrations in ground water have been above 10 mg/L (as N) for several decades. By the late 1940's, population in the Levittown area had grown to 36,000 with the construction of low-cost housing; at that time, the town had approximately 2.3 houses per acre. By 1975, the population had increased to 65,000, and the town contained 3.5 houses per acre. Typically, each house is serviced by a cesspool or septic tank that discharges effluent to the ground. As the cesspool effluent percolates to the water table, it becomes diluted by precipitation and, upon reaching the water table, it is mixed and further diluted by ground water moving southward beneath the area. The amount of water returned to the ground by cesspools is somewhat less than the average (1975) pumpage of 3.65 Mgal/d in the area because some is lost through consumptive use. Average natural recharge (1975) in the area is about 5 Mgal/d.

Despite dilution, substances continually introduced to the ground through cesspools cause gradual increases in chemical concentrations in the local ground water.

The amount of nitrogen excreted by a human adult averages about 20 grams per day (de Laguna, 1964, p. D38); thus, in 1950, when the population of Levittown was approximately 36,000, nitrogen yield from cesspools was 1,600 pounds per day, whereas in 1975, when the population was 65,000, nitrogen yield was 2,900 pounds per day. These yields may be in error by as much as 20 percent, however.

Table 2 shows nitrate (as N) concentrations in water from two shallow observation wells in Levittown from 1949-65. As early as 1949, nitrate (as N) concentration was at or above 9.5 mg/L in water from these wells. The early nitrate concentrations may reflect the residual effect of fertilizer application over thousands of acres of farmland before urbanization. After this period, however, when the number of housing units in Levittown increased by approximately 11,000, the principal source of nitrate in ground water was cesspools, although lawn fertilizers contributed an unknown but significant quantity of nitrate.

A network of monitoring wells tapping the water-table aquifer was installed over the past several decades by the Nassau County Department of Public Works to monitor water-table fluctuations. From 1974-77, the U.S. Geological Survey sampled 45 observation wells in Nassau County from three to 12 times a year to determine overall water quality and seasonal variations (fig. 13). Water-quality characteristics and results of analyses during the period of record are listed in appendix 1 (p. 77).

Appendix 1 presents all data on water quality for wells in and adjacent to Sewer District 3 that were analyzed by the U.S. Geological Survey. Between 1974 and 1976, some of the nitrogen species, the methylene blue active substances (MBAS), and phosphorus (P) analyses were done by Nassau County Department of Public Works. Current drinking-water standards set by local and Federal agencies are given in table 3 for comparison. The constituents that exceed those of the drinking-water standards most widely are iron, manganese, and nitrate.

Table 2.--Average nitrate (as N) concentrations in water from selected wells tapping water-table aquifer, Levittown, N.Y., 1948-65[1]

[All concentrations are in milligrams per liter]

	Well number and depth, in feet below land surface			Well number and depth, in feet below land surface	
Year	N 2403 (84)	N 2581 (81)	Year	N 2403 (84)	N 2581 (81)
1948	11	--	1953	15	--
1949	12	9.5	1954	14	1
1950	10	--	1961	15	--
1951	10	--	1963	--	14
1952	10	12	1965	19	15

1. Analyses by New York State Departmant of Health, Nassau County Department of Health, and U.S. Geological Survey

Table 3.--Summary of public water-supply standards by State and Federal agencies 1/

[in milligrams per liter, except as noted]

Constituent	New York State		Federal Government	
	Drinking water standards (1964)	Source water quality standards (1971)	Public Health Service drinking water standards (1962)	Safe Drinking Water Act, Interim Primary standards (1975)
Inorganic chemicals				
Ammonia (NH_3)	--	<2.00	--	--
Arsenic (As)	.05	.05	.05	.05
Barium (Ba)	1.00	1.00	1.00	1.00
Boron (B)	--	1.00	--	--
Cadmium	.01	.01	.01	.01
Chloride (Cl)	250	250	2/250	--
Chromium (Cr^{+6})	.05	.05	.05	8/.05
Copper (Cu)	1.00	<.20	2/1.00	--
Cyanide (CN)	.20	<.10	.20	.20
Fluoride (F)	1.5	<1.5	3/1.7	4/2.4
Iron (Fe)	.30	--	.30	--
Lead (Pb)	.05	.05	.05	.05
Manganese (Mn)	.30	--	2/.05	--
Mercury (Hg)	--	.005	--	.002
Nitrates & nitrites (N)	5/10	10	5/10	5/10
Selenium (Se)	.01	.01	.01	.01
Silver (Ag)	.05	.05	.05	.05
Sodium (Na)	--	<20	--	--
Sulfate (SO_4)	250	250	2/250	--
Total dissolved solids	500	500	2/500	--
Zinc (Zn)	5.00	<.30	2/.005	--
Organic chemicals				
Phenols	.001	.001	.001	--
MBAS	6/.50	--	6/.50	--
Insecticides				
Aldrin	--	.017	--	--
Chlordane	--	.003	--	.003
DDT	--	.042	--	--
Dieldrin	--	.017	--	--
Endrin	--	.001	--	.2 µg/L
Heptachlor	--	.018	--	.1 µg/L
Heptochlor epoxide	--	.018	--	.1 µg/L
Lindane	--	.056	--	.004
Methoxychlor	--	.035	--	.10
Toxaphene	--	.005	--	.05
Organic phosphates & carbonates	--	.10	--	--
Herbicides				
2,4-D	--	7/.10	--	.10
2,4,5-T + Silvex	--	--	--	.01

1/ Data from New York State Department of Health (1964, 1971); U.S. Public Health Service (1962); and U.S. Environmental Protection Agency, (1975).
2/ This value should not be exceeded if more suitable water supplies are available.
3/ Standard ranges from 0.6 to 1.7 mg/L, depending on annual average of maximum daily air temperature.
4/ Standard ranges from 1.4 to 2.4 mg/L, depending on annual average of maximum daily air temperature.
5/ Only nitrate as N.
6/ Standard is for alkyl benzene sulfonate measured as MBAS.
7/ Includes 2,4,5-T + Silvex.
8/ Total chromium.

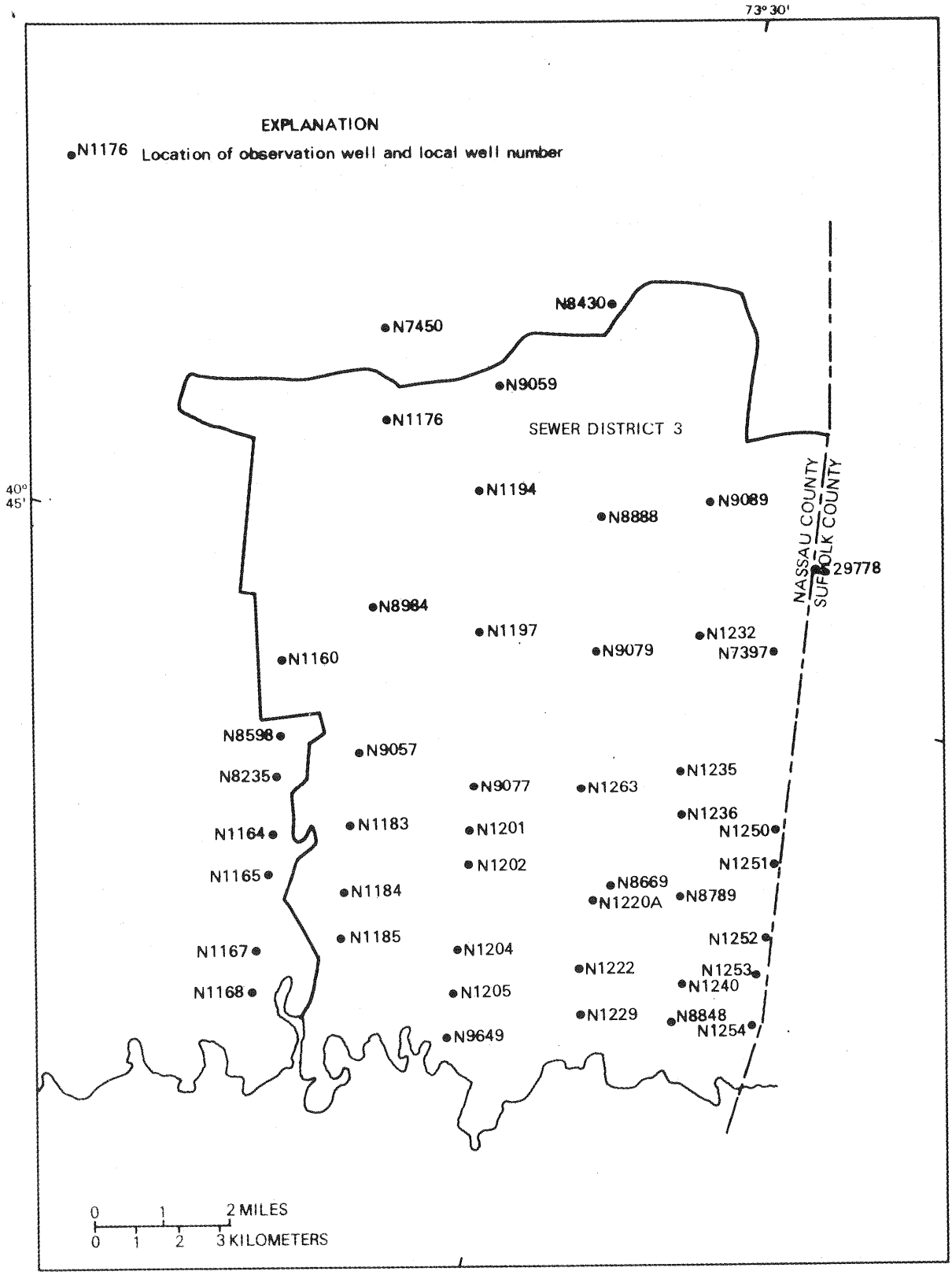


Figure 13.--Location of wells used to monitor the water-table aquifer in and adjacent to Sewer District 3 during 1974-77.

Concentrations of trace metals in the water-table aquifer are given in Appendix 2; locations of wells listed in Appendix 2 are shown in figure 13. Most heavy-metal concentrations in well water are below the drinking-water limits. However, water from wells N8888 and N1235 has higher concentrations than water from other wells sampled. It is difficult to determine the cause of the high concentrations because only one sample per well was taken. The only known area of heavy-metal contamination in the study area is in the south Farmingdale-Massapequa area, where a plume of chromium- and cadmium-enriched water has developed since 1942 (Perlmutter and Lieber, 1970; Ku and others, 1978). The plume has remained static owing to its continued replenishment by treated industrial effluent from disposal basins and the interception of the plume's leading edge by Massapequa Creek. Preliminary findings of a recent study (Ku and others, 1978) show that an average of 9.7 mg of chromium and 1.65 mg of cadmium are retained per kilogram of aquifer material, and that the maximum amount of chromium and cadmium retained per kilogram of aquifer material are 19.2 mg and 2.3 mg, respectively.

Areal distribution of nitrate and ammonium concentrations in the water-table aquifer are shown in figures 14 and 15. The values plotted are the median values for the entire period of record, ending in 1976. Most well data were gathered during 1974-77; therefore, the median values generally reflect recent conditions.

In the central and northern part of Sewer District 3, the predominant species of nitrogen is nitrate (fig. 14). In the central part, nitrate (as N) concentration exceeds 10 mg/L. The distribution of nitrate, as shown in figure 14, agrees with that described by Perlmutter and Koch (1972), in which zones of high nitrate are indicated in both Sewer Districts 2 and 3. Perlmutter and Koch (1972) also show areas of low nitrate concentration in Sewer District 2 that have resulted from installation of local sewerage, and they also report that low nitrate concentrations (less than 10 mg/L as N) were found beneath parks, golf courses, and sparsely populated areas.

In the parts of Sewer District 3 where the thickness of the unsaturated zone exceeds 30 ft, almost all nitrogen in ground water is in the form of nitrate. This seems to agree with the findings of the New York State Department of Health (1972, p. 4-24) that nitrate concentrations in sewage generally increase with movement through the unsaturated zone. Nitrate concentrations are virtually zero in raw sewage because most of the nitrogen is in the form of ammonium. Ultimately, oxidation converts ammonium to nitrate.

Ammonium concentration is higher in the southern part of Sewer District 3 (fig. 15), where the unsaturated zone is thin, than in the northern part. The New York State Department of Health (1972, p. 7-43) reports that ammonium concentrations in sewage decrease with movement through the unsaturated zone. This may explain why ammonium concentrations were higher near the south shore than in the middle of Sewer District 3, where the unsaturated zone decreases in thickness south of the ground-water divide. Because this area is not sewered, the major nitrogen sources are assumed to be cesspool and septic-tank effluents and lawn fertilizers.

Because the major source of ammonium in the water-table aquifer is cesspool and septic-tank effluent, sewerage should cause a reduction in the amount of ammonium in the ground water. Comparison of ammonium concen-

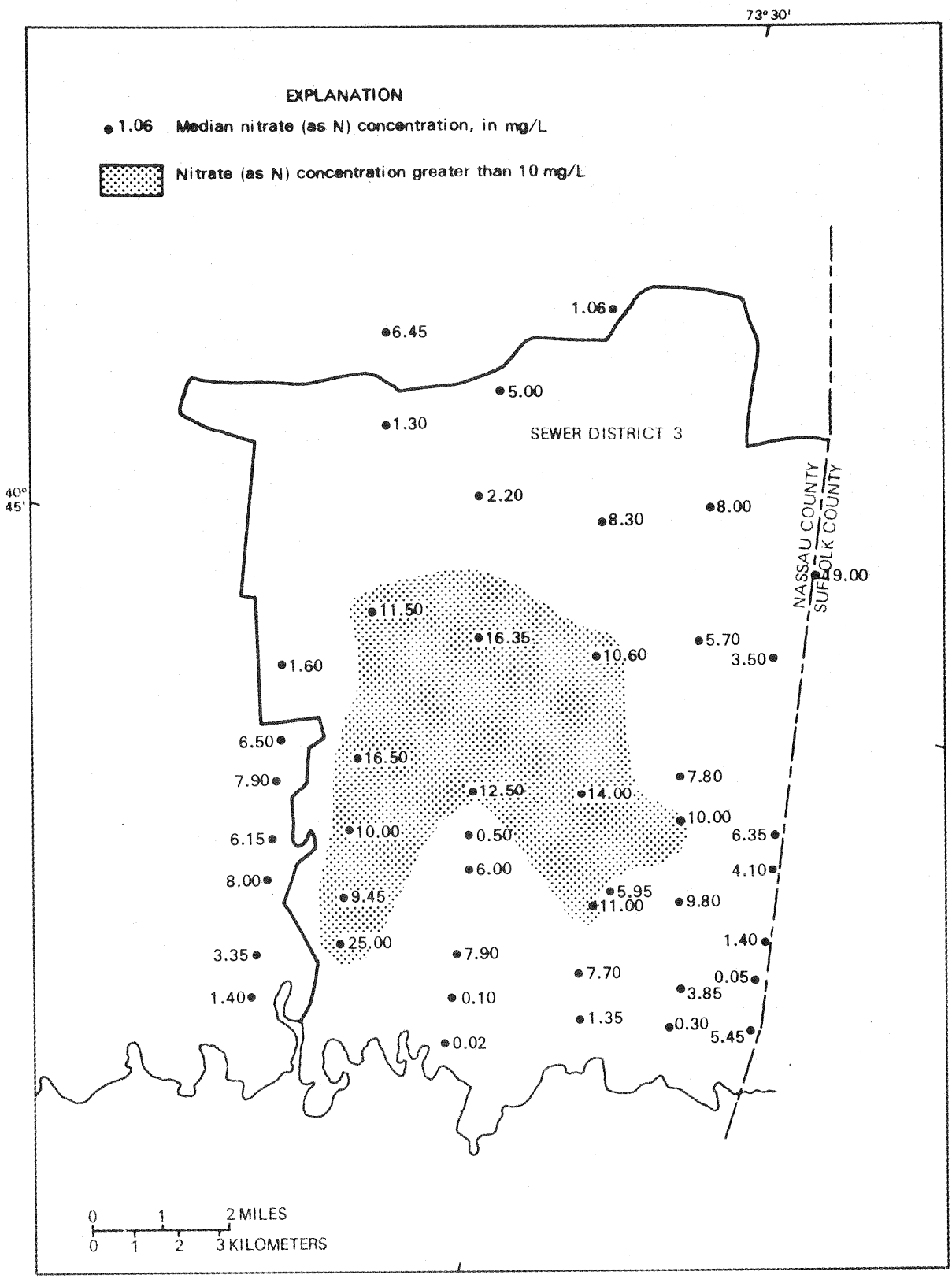


Figure 14.--Median nitrate (as N) concentrations in water-table aquifer in and adjacent to Sewer District 3 during period of record through 1976.

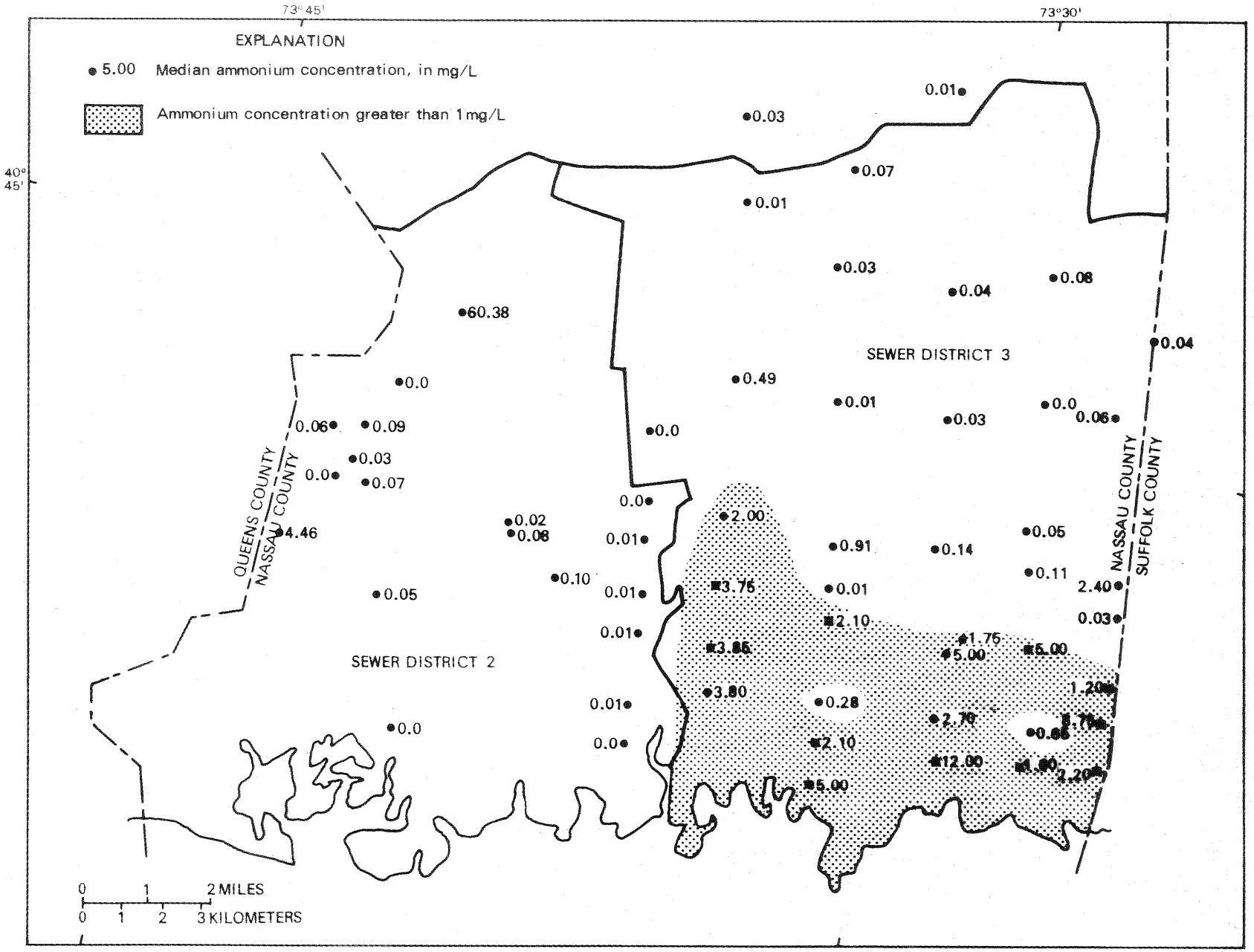


Figure 15.--Median ammonium (as N) concentrations in water-table aquifer in Sewer Districts 2 and 3 during period of record through 1976.

trations in the shallow aquifer in the sewered and unsewered areas shows that median ammonium values in the southern (sewered) part of Sewer District 2 are lower than in Sewer District 3 (fig. 15); the median value in the southern part of Sewer District 2 was approximately 0.1 mg/L, whereas in the southern part of Sewer District 3, it was approximately 1.8 mg/L. The two wells that had high median ammonium (as N) values of 4.5 and 60 mg/L in Sewer District 2 are in or next to municipal waste-disposal facilities, which suggests local influences. In the north-central part of Sewer District 3, ammonium (as N) values are low, ranging from 0 to 0.49 mg/L. However, this low range is offset by higher nitrate values.

Total nitrogen (as nitrate and ammonium) in water in Sewer District 3 (fig. 16) does not vary from place to place to the extent that nitrate and ammonium do individually. This suggests that total nitrogen input in Sewer District 3 is relatively uniform and that the relative concentrations of ammonium and nitrate in the water-table aquifer are controlled by the thickness of the unsaturated zone.

Dissolved Oxygen

Figure 17 shows dissolved-oxygen concentration in shallow ground water in Sewer Districts 2 and 3. The median values of dissolved oxygen were computed from the total period of record through 1976. Again, a large amount of data were collected during the study period; therefore, the median values tend to bias the more recent data. Also, the dissolved-oxygen concentrations near the northern part of Sewer Districts 2 and 3 are of questionable accuracy because dissolved oxygen cannot be measured directly in the wells where the water level is more than 50 feet below land surface. The average median dissolved-oxygen concentration of shallow ground water in Sewer District 2 was 4.3 mg/L; in Sewer District 3 it was 2.4 mg/L. The lower value in Sewer District 3 may reflect the oxidation of a greater amount of ammonium to nitrate as a result of cesspool and septic-tank operation.

Iron and Manganese

Total iron and total manganese concentrations that exceeded drinking water standards (table 3) were found in water from many water-table wells in the southern part of the study area (appendix 1). Pluhowski and Kantrowitz (1964) attributed the iron and manganese in ground water to the solvent action of water (with the aid of bacteria) on minerals in the aquifer containing these elements.

Temporal Variation

To determine temporal variation of water quality, all wells used in this study were sampled at least four times a year, and some were sampled as many as 12 times a year. Wells with more than 2 years of record on well-lines "O" and "U" (fig. 18) were used to determine the fluctuation in constituent concentration with time. Time plots of nitrate and chloride concentration and temperature at selected wells are presented in figures 19 and 20. Well line "O" is near the center of Sewer District 3, whereas line "U" is at the Nassau-Suffolk County border. The southern part of well line "U" has been used by Franke (1968) and Garber and Sulam (1976) as a reference well line in their study of water-level changes due to sewerage.

The time plots show considerable fluctuation during 1974-76. No pattern is evident except for the seasonal changes in water temperature that follow the seasonal changes in air temperature (figs. 19 and 20). Much of the nitrate and chloride fluctuation may be due to local alteration of water quality by nearby cesspools, as suggested by high concentrations of these constituents. Table 4 (p. 41) shows the median and range of selected groundwater constituents at wells used in this study and indicates a large variation around the median. The apparently random variability of data in figures 19 and 20 and table 4 is an indication of the difficulty of assessing the water quality of this region if only a few samples are collected.

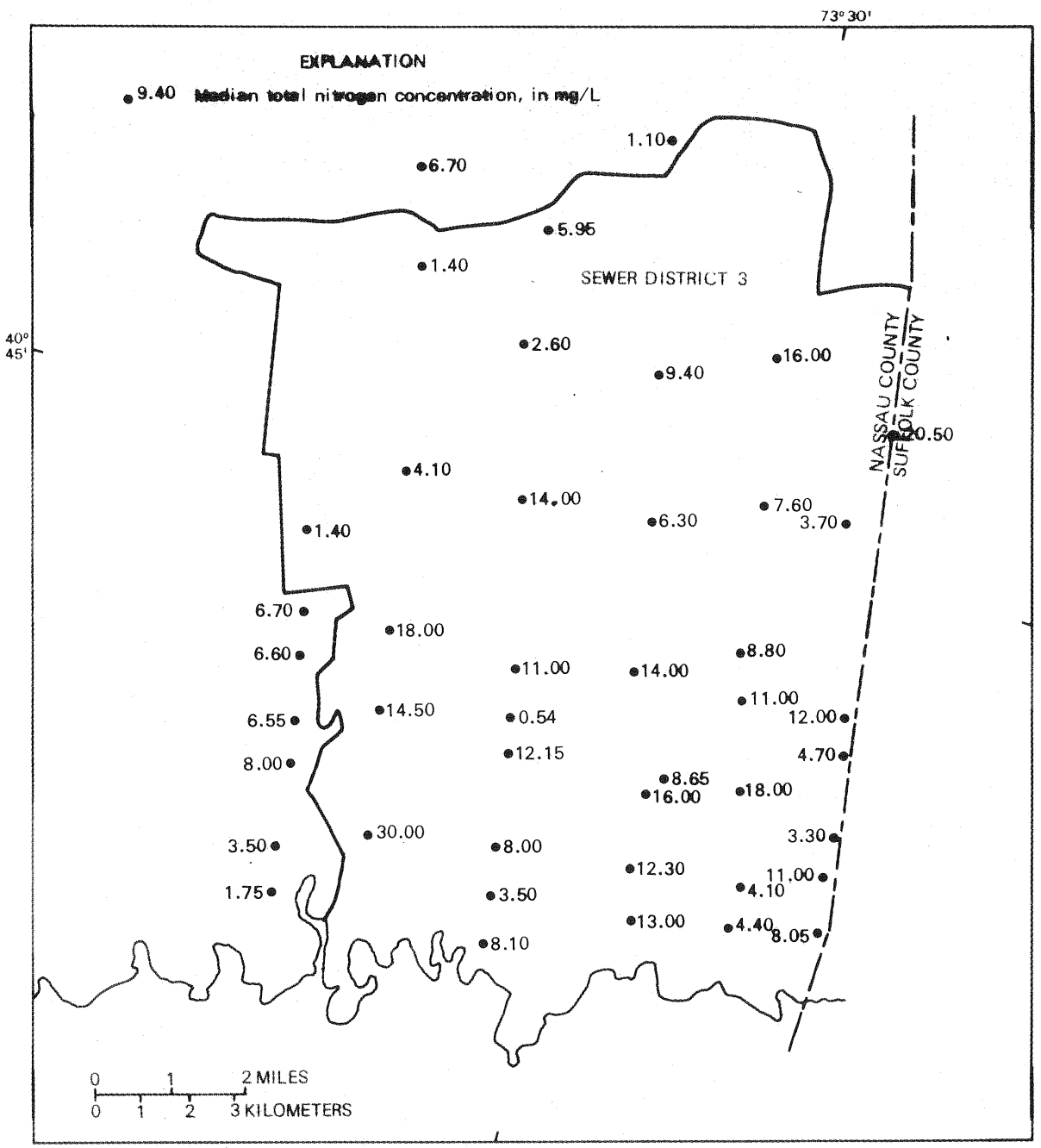


Figure 16.--Median total nitrogen (as N) concentration in water-table aquifer in Sewer District 3 during period of record through 1976.

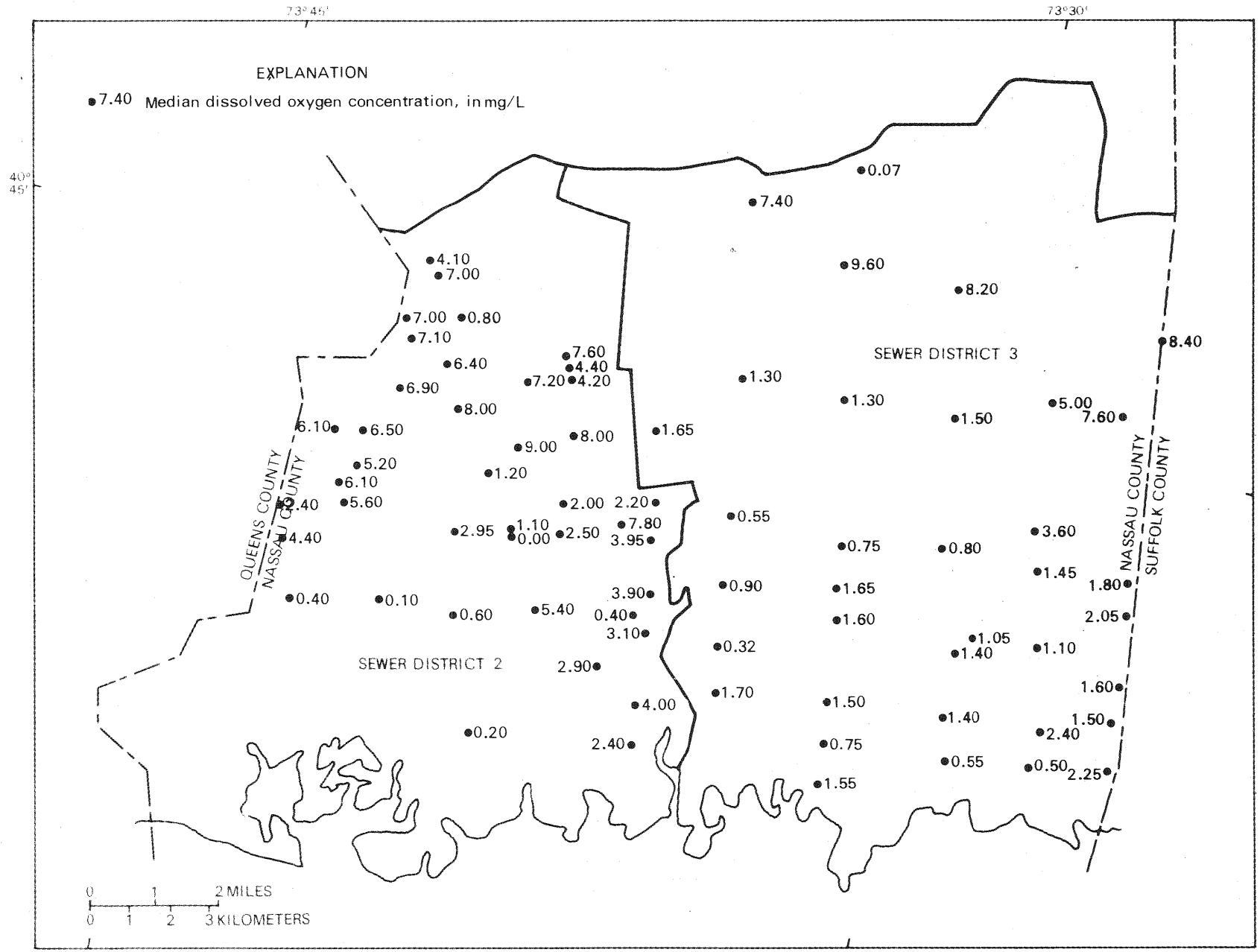


Figure 17.--Median dissolved-oxygen concentrations in water-table aquifer, Sewer Districts 2 and 3, during period of record through 1976.

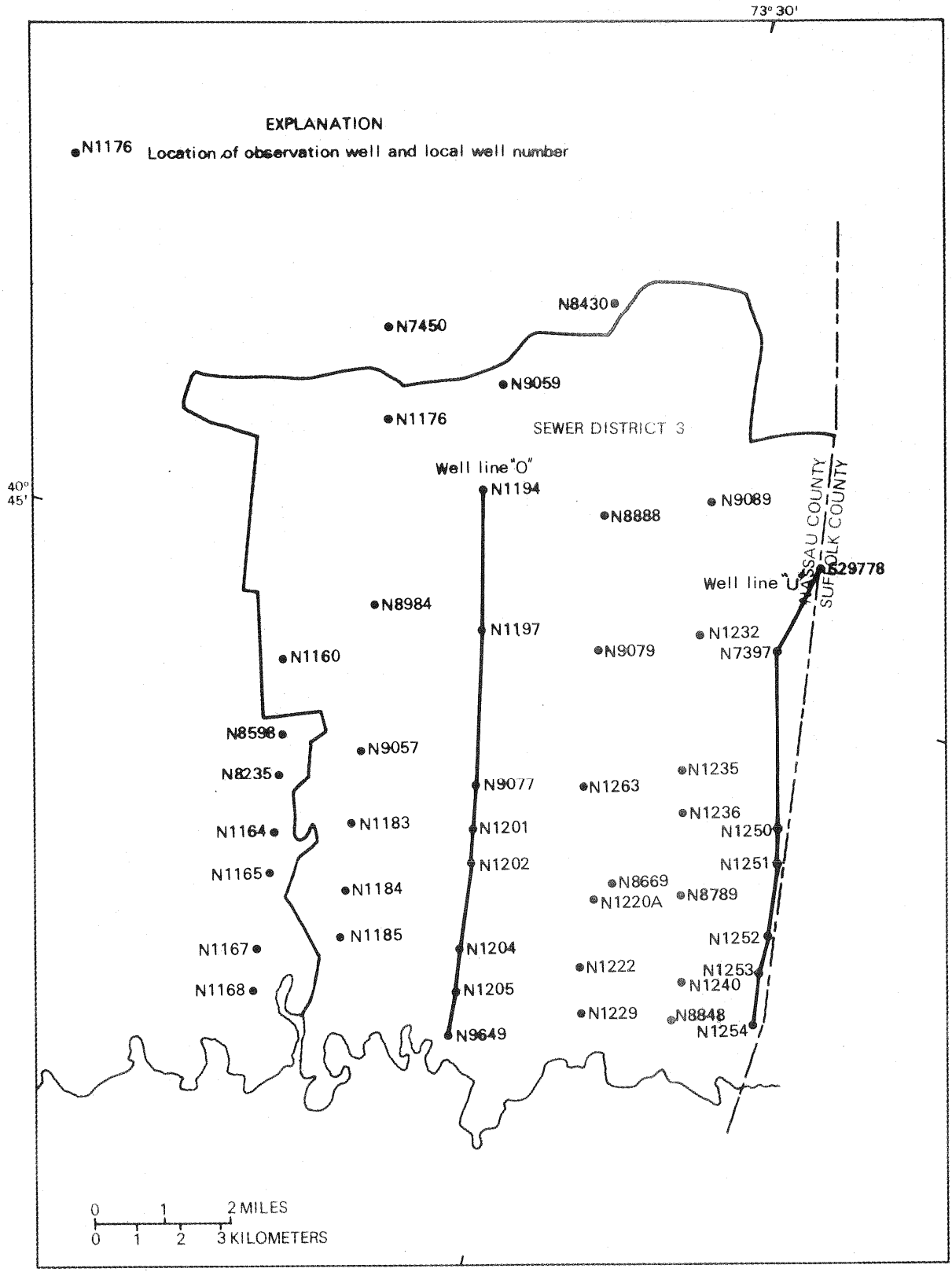


Figure 18.--Location of well lines "O" and "U" in Sewer District 3.

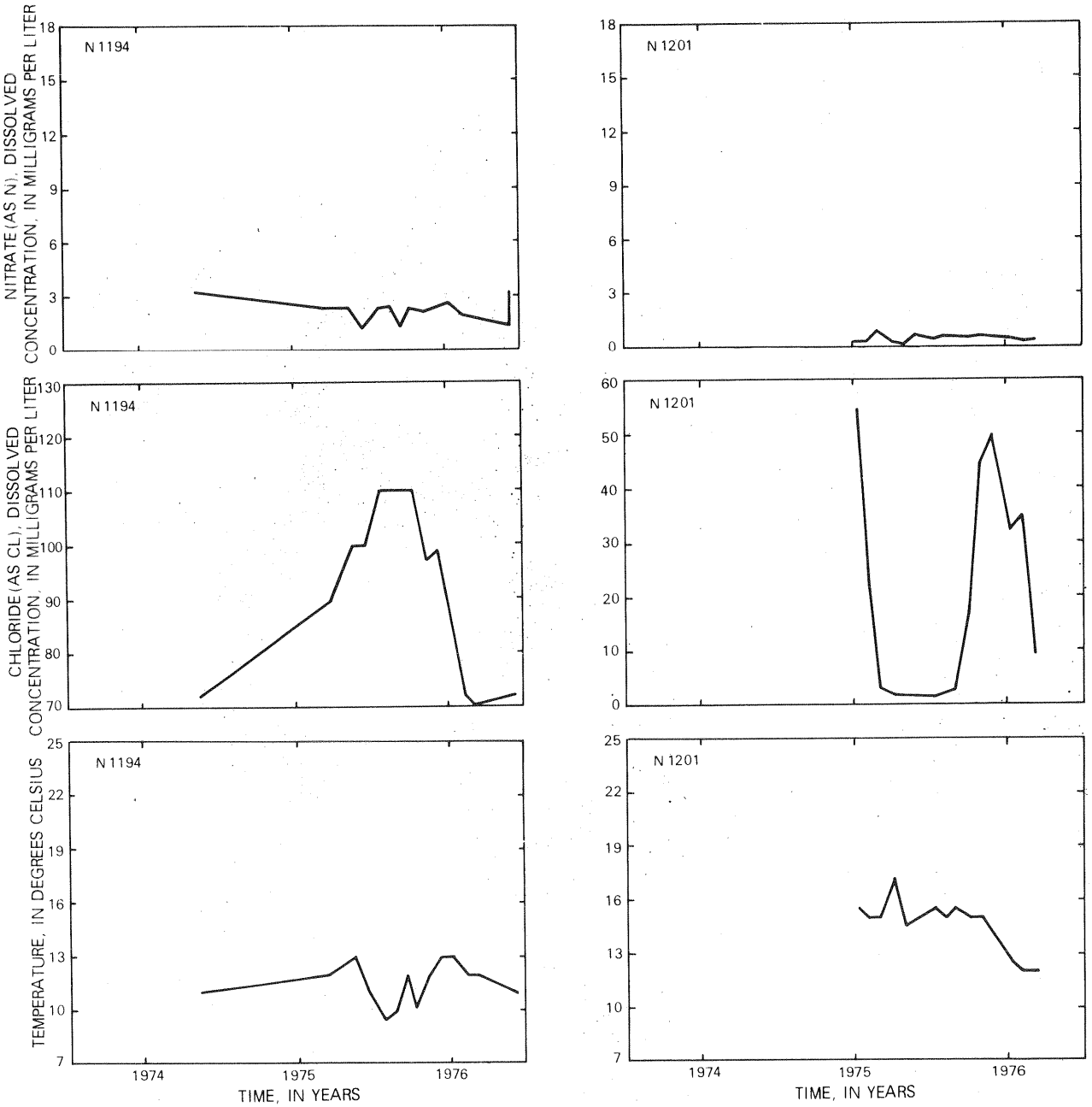


Figure 19.--Temporal fluctuation of temperature, chloride (as Cl) concentration, and nitrate (as N) concentrations of water at selected wells along well line "O," 1974-76.

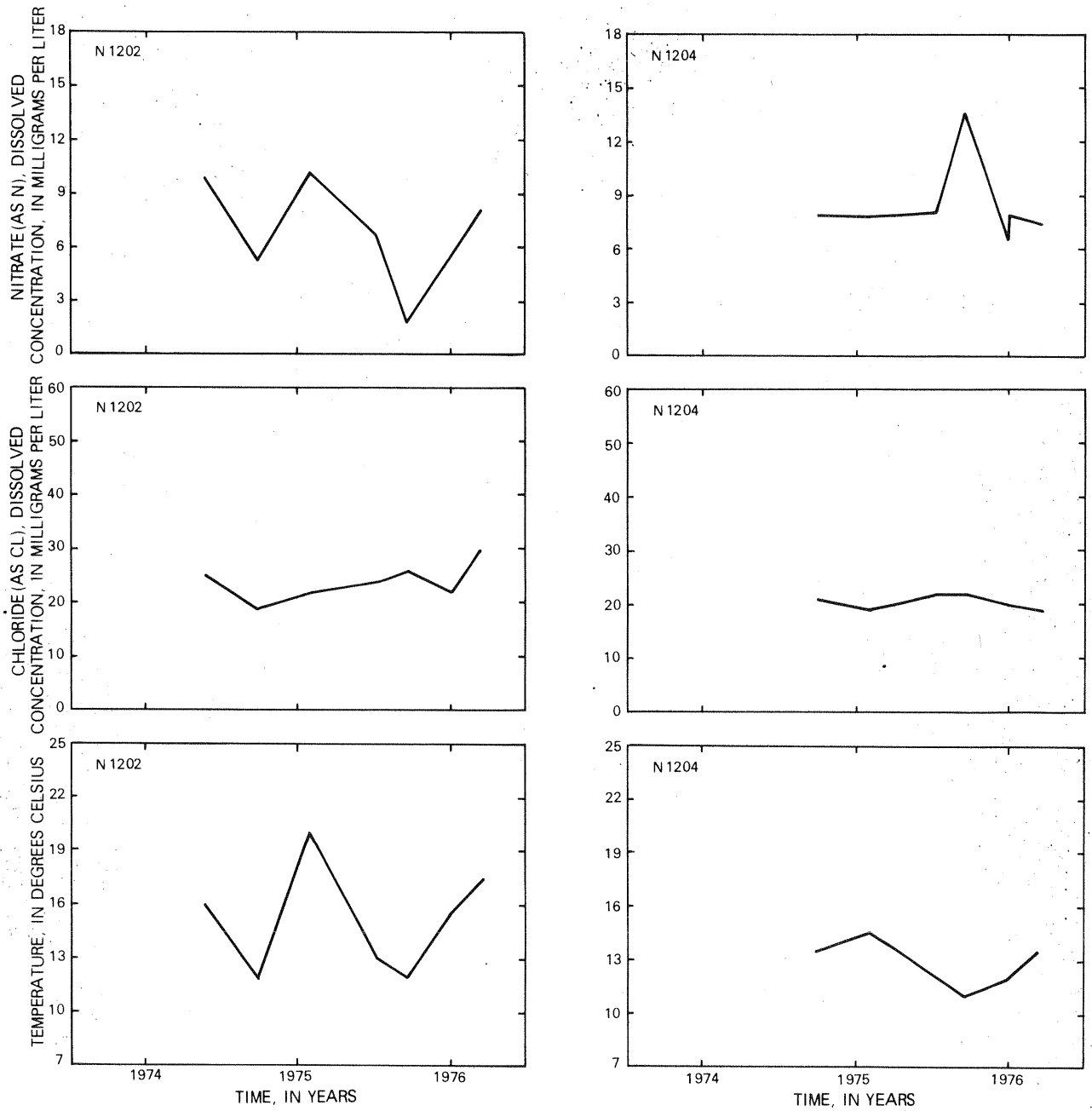


Figure 19 (continued).--Temporal fluctuation of temperature, chloride (as Cl) concentration, and nitrate (as N) concentrations of water at selected wells along well line "O," 1974-76.

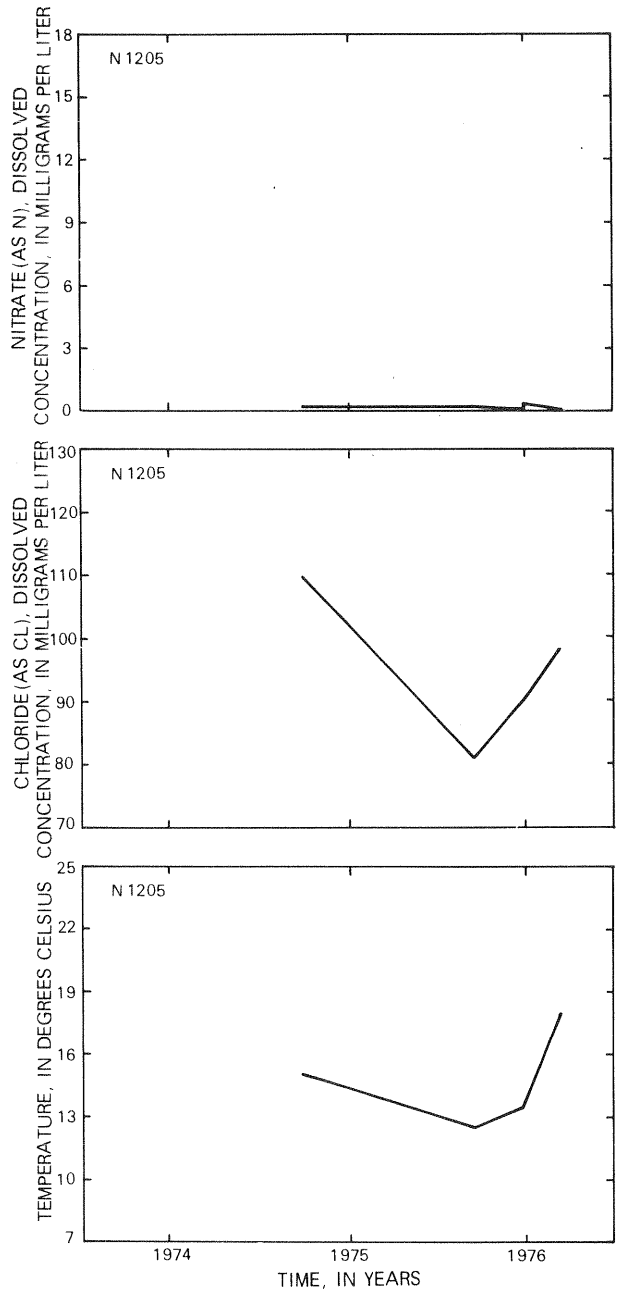


Figure 19 (continued).--Temporal fluctuation of temperature, chloride (as Cl) concentration, and nitrate (as N) concentrations of water at selected wells along well line "O," 1974-76.

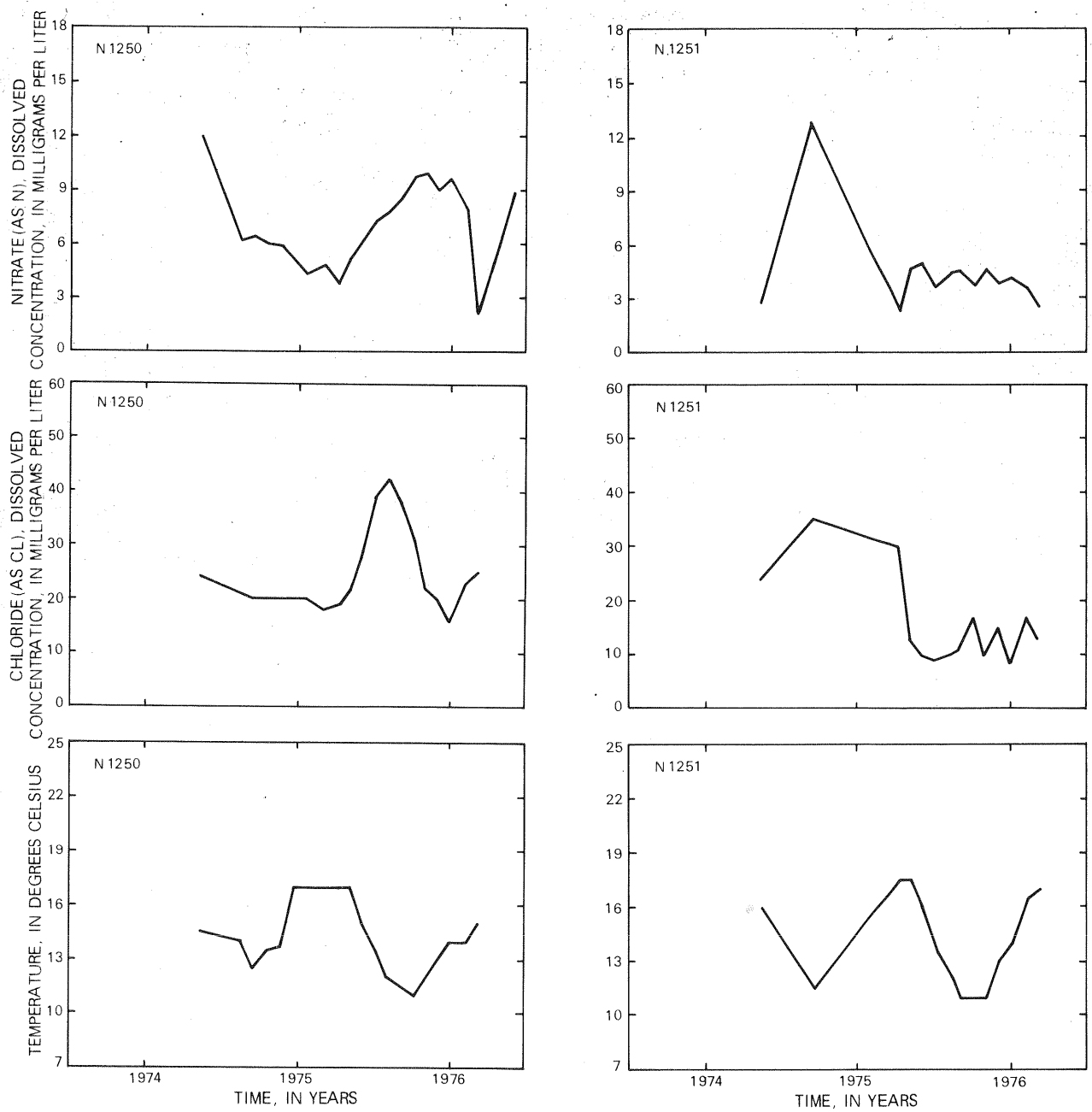


Figure 20.--Temporal fluctuation of temperature, chloride (as Cl) concentration, and nitrate (as N) concentrations of water at selected wells along well line "U," 1974-76.

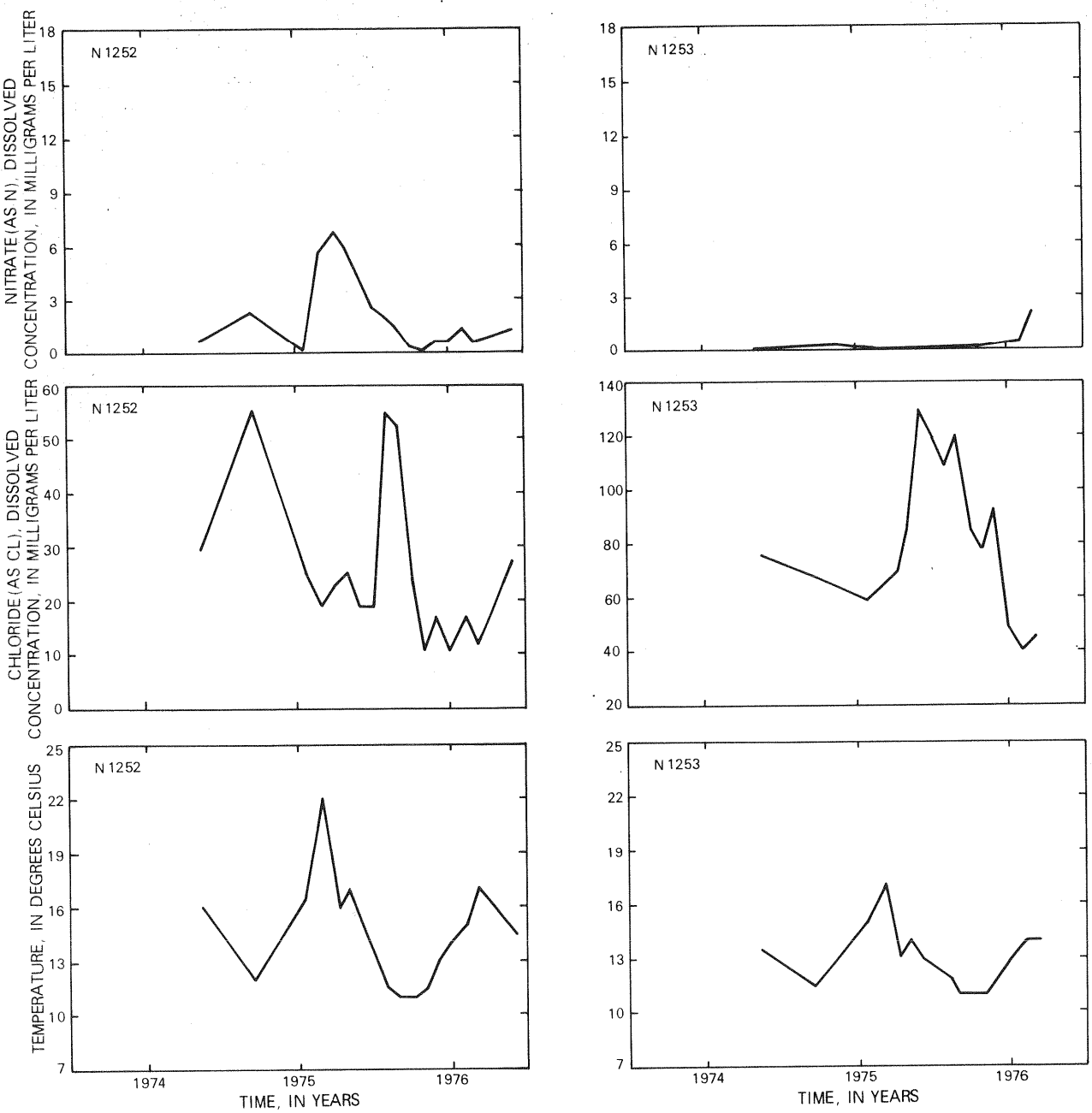


Figure 20 (continued).--Temporal fluctuation of temperature, chloride (as Cl) concentration, and nitrate (as N) concentrations of water at selected wells along well line "U," 1974-76.

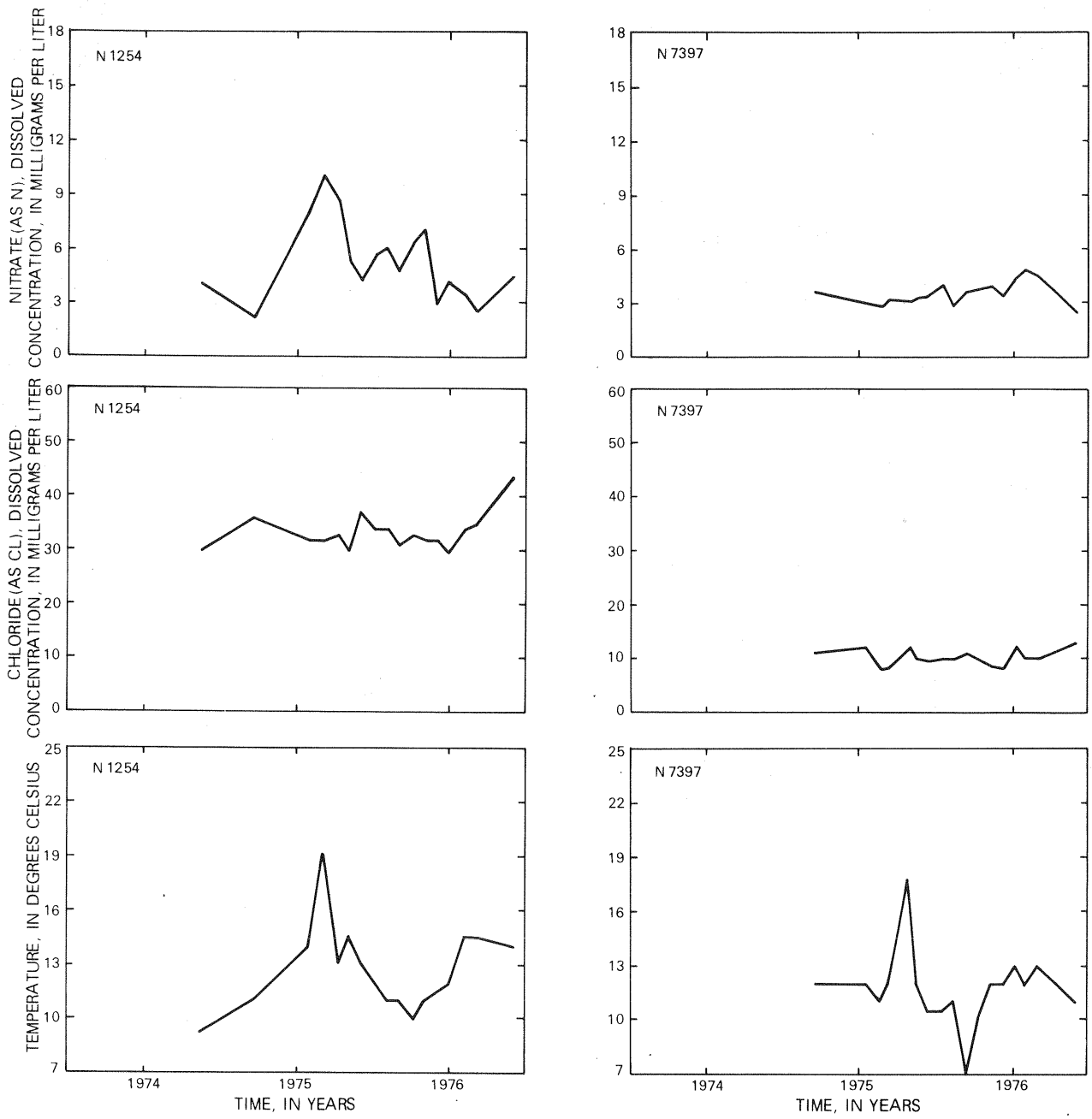


Figure 20 (continued).--Temporal fluctuation of temperature, chloride (as Cl) concentration, and nitrate (as N) concentrations of water at selected wells along well line "U," 1974-76.

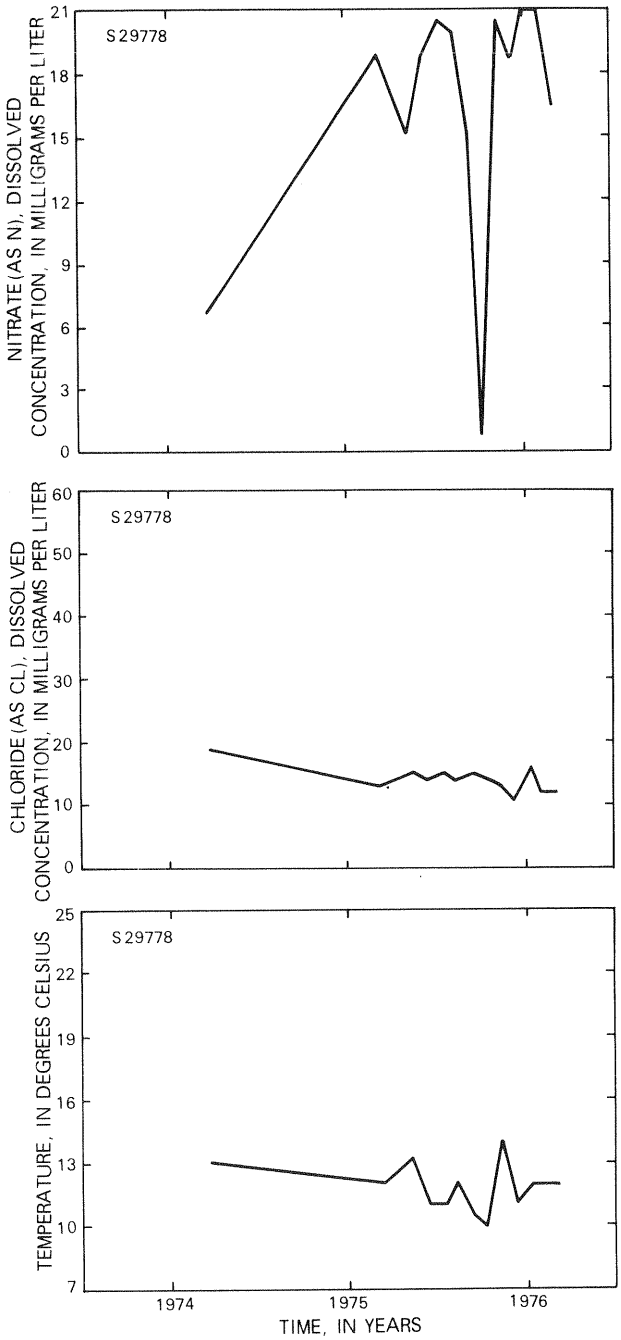


Figure 20 (continued).--Temporal fluctuation of temperature, chloride (as Cl) concentration, and nitrate (as N) concentrations of water at selected wells along well line "U," 1974-76.

Table 4.--Median and range of nitrate, chloride, and dissolved-solids concentrations of water from water-table aquifer, Sewer District 3, 1974-77.

[Well locations are shown in fig. 13]

A. NITRATE (as N)

Well	Number of samples	Concentration		
		Median	Minimum	Maximum
N 1160	13	1.60	0.91	2.60
N 1164	18	6.15	2.50	7.50
N 1165	18	8.00	0.11	11.00
N 1167	14	3.35	2.00	4.70
N 1168	15	1.40	0.40	1.80
N 1176	9	1.30	1.20	2.10
N 1183	18	10.00	3.80	14.00
N 1184	2	9.45	9.30	9.60
N 1185	7	25.00	8.70	29.50
N 1194	18	2.20	1.20	3.20
N 1197	4	16.35	10.50	18.50
N 1201	18	0.50	0.01	15.00
N 1202	10	6.00	1.40	10.20
N 1204	9	7.90	6.50	19.00
N 1205	5	0.10	0.06	0.30
N 1220A	5	11.00	8.00	14.50
N 1222	7	7.70	5.60	10.60
N 1232	5	5.70	3.90	8.60
N 1235	9	7.80	2.00	21.00
N 1236	5	10.00	2.60	11.00
N 1240	8	3.85	1.20	16.50
N 1250	22	6.35	2.20	12.00
N 1251	17	4.10	1.00	23.00
N 1252	19	1.40	0.05	7.20
N 1253	23	0.05	0.00	3.80
N 1254	20	5.45	2.20	10.00
N 1263	9	14.00	9.00	21.00
N 7397	16	3.50	2.50	4.80
N 7450	2	6.45	6.30	6.60
N 8235	19	7.90	2.30	15.00
N 8430	2	1.06	0.93	1.20
N 8598	10	6.50	2.30	9.70
N 8649	5	0.02	0.01	0.10
N 8669	14	5.95	3.20	7.30
N 8706	2	0.05	0.00	0.10
N 8789	15	9.80	3.60	13.00
N 8848	5	0.30	0.01	1.80
N 8888	13	8.30	2.40	11.00
N 8984	4	11.50	2.90	13.50
N 9057	6	16.50	9.30	17.70
N 9059	3	5.00	4.60	6.90
N 9077	5	12.50	10.00	13.40
N 9079	4	10.60	5.10	13.40
N 9089	2	8.00	0.00	16.00
S 29778	15	19.00	0.95	22.00

Table 4.--(Continued)

[Well locations are shown in fig. 13]

B. CHLORIDE (as Cl)

Well	Number of samples	Concentration Median	Minimum	Maximum
N 1160	13	11.00	6.90	19.00
N 1164	17	33.00	24.00	71.00
N 1165	17	35.00	22.00	55.00
N 1167	15	20.00	10.00	34.00
N 1168	15	28.00	17.00	44.00
N 1176	9	4.70	2.60	8.30
N 1183	18	30.50	11.00	39.00
N 1184	3	35.00	31.00	37.00
N 1185	5	32.00	27.00	33.00
N 1194	17	89.00	48.00	110.00
N 1197	4	23.00	22.00	28.00
N 1201	18	13.05	1.30	86.00
N 1202	10	25.50	19.00	67.00
N 1204	8	21.50	19.00	27.00
N 1205	4	94.00	81.00	110.00
N 1220A	5	31.00	28.00	35.00
N 1222	7	32.00	28.00	52.00
N 1232	4	22.00	18.00	34.00
N 1235	8	18.00	6.00	27.00
N 1236	5	17.00	12.00	19.00
N 1240	8	31.50	18.00	210.00
N 1250	16	22.50	16.00	42.00
N 1251	17	15.00	8.20	48.00
N 1252	18	21.00	11.00	98.00
N 1253	20	72.50	18.00	130.00
N 1254	19	32.00	24.00	44.00
N 1263	9	22.00	17.00	29.00
N 7397	17	10.00	8.10	13.00
N 7450	2	8.20	8.00	8.40
N 8235	20	40.00	22.00	68.00
N 8430	3	5.40	4.90	5.80
N 8598	10	36.00	27.00	43.00
N 8649	7	170.00	3.10	470.00
N 8669	14	31.50	14.00	45.00
N 8706	2	3.60	3.10	4.10
N 8789	15	30.00	27.00	46.00
N 8848	5	11.00	4.90	22.00
N 8888	13	28.00	23.00	37.00
N 8984	4	26.50	17.00	54.00
N 9057	6	28.50	27.00	31.00
N 9059	3	180.00	53.00	180.00
N 9077	5	37.00	36.00	38.00
N 9079	4	12.50	9.60	14.00
N 9089	2	15.50	15.00	16.00
N 29778	16	14.00	11.00	23.00

Table 4.--(Continued)

C. DISSOLVED SOLIDS

Well	Number of samples	Concentration Median	Maximum	Minimum
N 1160	13	68.00	53.00	84.00
N 1164	16	179.50	141.00	233.00
N 1165	17	212.00	173.00	266.00
N 1167	15	142.00	111.00	179.00
N 1168	14	148.00	132.00	158.00
N 1176	9	35.00	30.00	39.00
N 1183	18	188.50	113.00	240.00
N 1184	2	221.50	197.00	246.00
N 1185	5	201.00	190.00	328.00
N 1194	16	228.50	186.00	253.00
N 1197	4	166.00	157.00	236.00
N 1201	16	49.00	23.00	151.00
N 1202	8	172.50	14.00	282.00
N 1204	6	134.00	121.00	171.00
N 1205	4	306.00	295.00	318.00
N 1220A	5	208.00	201.00	252.00
N 1222	7	168.00	155.00	213.00
N 1232	4	82.50	73.00	126.00
N 1235	7	113.00	69.00	158.00
N 1236	4	136.50	99.00	179.00
N 1240	7	225.00	157.00	476.00
N 1250	16	159.50	121.00	182.00
N 1251	15	140.00	120.00	261.00
N 1252	17	131.00	83.00	217.00
N 1253	17	278.00	197.00	375.00
N 1254	17	194.00	11.00	232.00
N 1263	7	140.00	115.00	210.00
N 7397	17	49.00	30.00	67.00
N 7450	2	88.00	73.00	103.00
N 8235	17	203.00	162.00	248.00
N 8430	3	56.00	51.00	59.00
N 8598	8	175.50	15.30	187.00
N 8649	6	552.50	17.00	977.00
N 8669	14	174.00	129.00	193.00
N 8706	2	14.01	0.02	28.00
N 8789	16	226.00	172.00	241.00
N 8848	5	145.00	77.00	179.00
N 8888	13	192.00	175.00	227.00
N 8984	4	120.50	110.00	146.00
N 9057	6	172.00	160.00	242.00
N 9059	3	368.00	241.00	394.00
N 9077	5	160.00	156.00	205.00
N 9079	4	97.00	82.00	121.00
N 9089	2	106.50	74.00	139.00
S 29778	16	147.00	31.00	172.00

Ground-Water Data from Infiltration Galleries

Parts of the old Ridgewood Water Supply System, which provided water to New York City in the past, still (1977) remain in Nassau County. The sources for that supply system included well fields, ponds, and infiltration galleries. The eastern watershed facilities are in Sewer District 3; these include ponds, driven wells, and two infiltration galleries. Before the early 1950's, the infiltration galleries, which consist of buried vitrified pipes laid horizontally and perpendicular to ground-water flow, provided as much as 40 Mgal/d of water to New York City; however, because the quality of water from this area has deteriorated considerably during the last 50 years (Sulam and Ku, 1977), the galleries have been abandoned. They can, however, be pumped to provide a regional water-quality monitoring system that extends 6 miles from Massapequa to Wantagh (fig. 21).

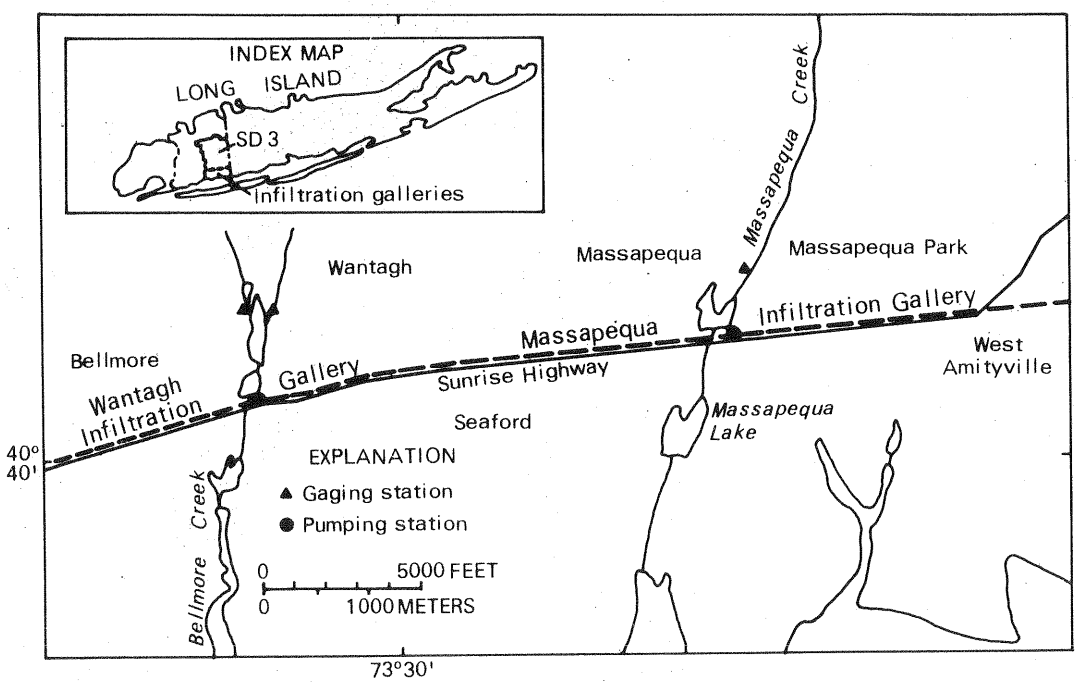


Figure 21.--Location of Wantagh and Massapequa infiltration galleries. (Modified from Sulam and Ku, 1977.)

Water Quality

Data on water from the infiltration galleries indicate that, during 1910-75, chemical concentrations, in milligrams per liter, ranged as follows:

Constituent	Wantagh	Massapequa
Nitrate (as N)	0.6 - 9.2	0.26 - 7.8
Hardness (as $CaCO_3$)	18 - 94	20 - 88
Chloride	5.9 - 44	5.7 - 43
Total solids	51 - 249	54 - 228

(From Sulam and Ku, 1977.)

During 1910-40 and 1940-60, nitrate, hardness, chloride, and total solids concentrations increased at the Wantagh and Massapequa infiltration galleries as shown in figure 22. After 1965, nitrate concentration showed a declining trend although it was greater after 1965 than in the previous periods. The increase in nitrate in the area is attributed to the rise in population from approximately 10,000 in 1940 to 90,000 in 1970 (Sulam and Ku, 1977).

Constituent Load Discharged to Tidewater

From water-quality data from the galleries, combined with stream-discharge and subsurface-outflow data, Sulam and Ku (1977) calculated the constituent load discharged to the bays south of the study area. Table 5 shows the estimated constituent load discharged during 1966-75.

Table 5.--Estimated constituent load for streamflow, streamflow pickup south of gaging stations, and sursurface ground-water discharge to bays in study area, 1966-75

[Modified from Sulam and Ku, 1977]

Source	Constituents (in pounds per day)		
	Nitrate (as N)	Chloride	Total Solids
STREAMFLOW			
At gages[1/]	340	1,700	9,420
Streamflow pickup south of gages	620	2,800	19,200
SUBSURFACE OUTFLOW			
Upper glacial aquifer at shoreline	740	3,600	23,800
Magothy aquifer	0.7	380	2,410
TOTAL	1,700	8,400	54,800

1/ Locations of gages are shown in figure 21.

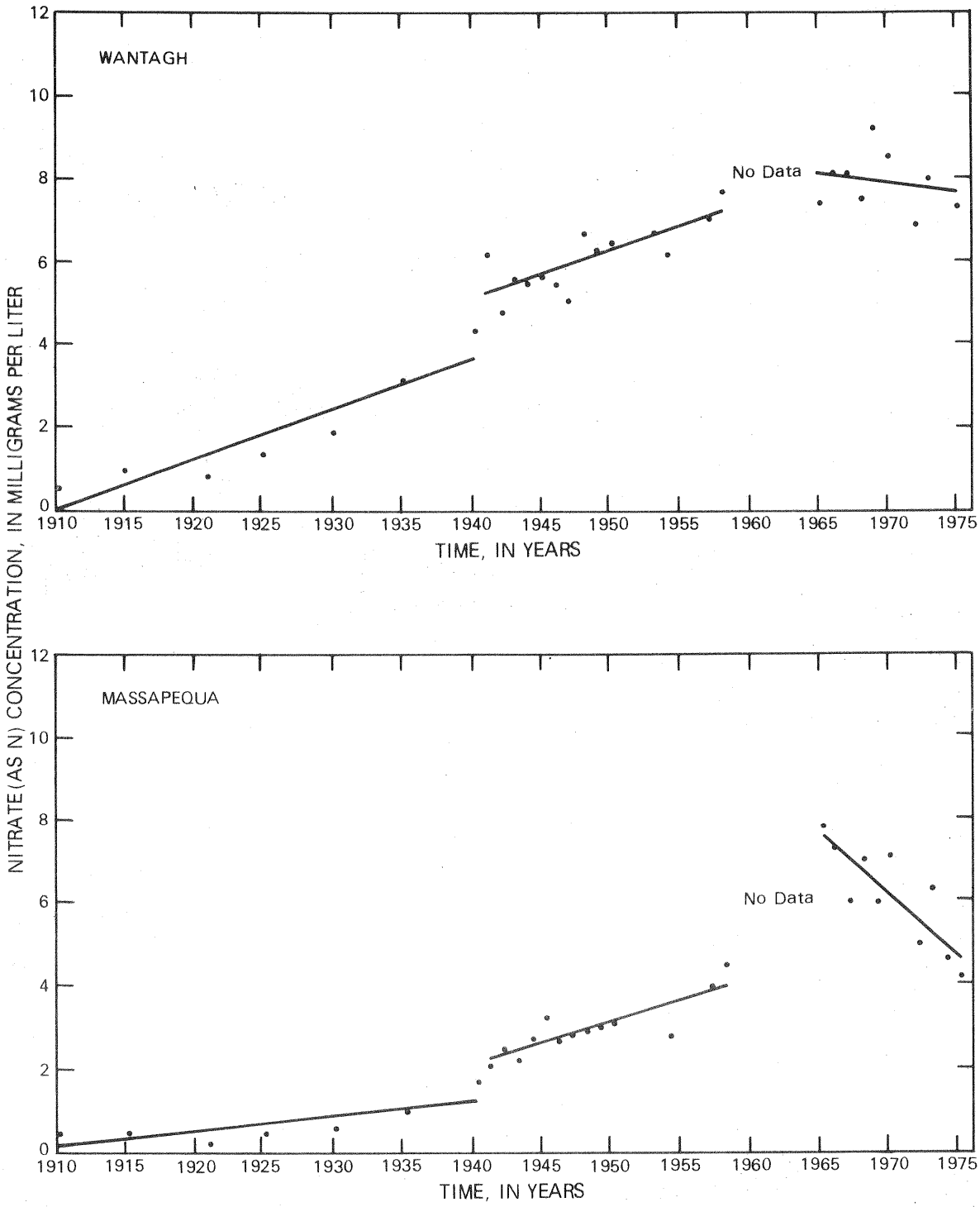


Figure 22.--Least-square plot of nitrate concentration of water at Wantagh and Massapequa infiltration galleries during three periods of suburban development. (Modified from Sulam and Ku, 1977.)

Public-Supply Wells

Pumpage

Pumpage from public-supply wells in Nassau County during 1975 was 170 Mgal/d; total pumpage that year in Sewer District 3 was approximately 53 Mgal/d. Table 6 summarizes pumpage in the water districts of Sewer District 3 by aquifer; figure 23 shows the distribution of public-supply pumpage in Sewer District 3 during 1975.

The increase in pumpage from public-supply wells by water districts in Sewer District 3 during 1950-76 is summarized in table 7. The pattern of the increases in ground-water withdrawals is illustrated by pumpage totals of

Table 6.--Summary of pumpage by aquifer from public-supply wells in Sewer District 3, Nassau County, 1975

[Locations of water districts are shown in figure 23]

Water District	Population	Pumpage (in thousands of gallons)			
		Upper glacial	Magothy	Lloyd	Total
New York Water Service	171,080	0	4,495,808	0	4,495,808
Massapequa	51,000	0	1,598,496	0	1,598,496
Farmingdale	9,925	0	347,644	0	347,644
South Farmingdale	55,000	152,603	1,159,589	0	1,312,192
East Meadow	50,000	0	1,694,502	0	1,694,502
Levittown	50,000	0	1,330,975	0	1,330,975
Bethpage	32,950	0	1,033,280	0	1,033,280
Hicksville	60,000	0	2,022,257	0	2,022,257
Plainview	46,000	0	1,553,144	0	1,553,144
Jericho	58,100	0	2,754,043	0	2,754,043
Westbury	18,000	0	758,172	93,345	851,517
Carle Place	10,000	0	438,283	0	438,283
TOTAL					19,432,141 (53.2 Mgal/d)

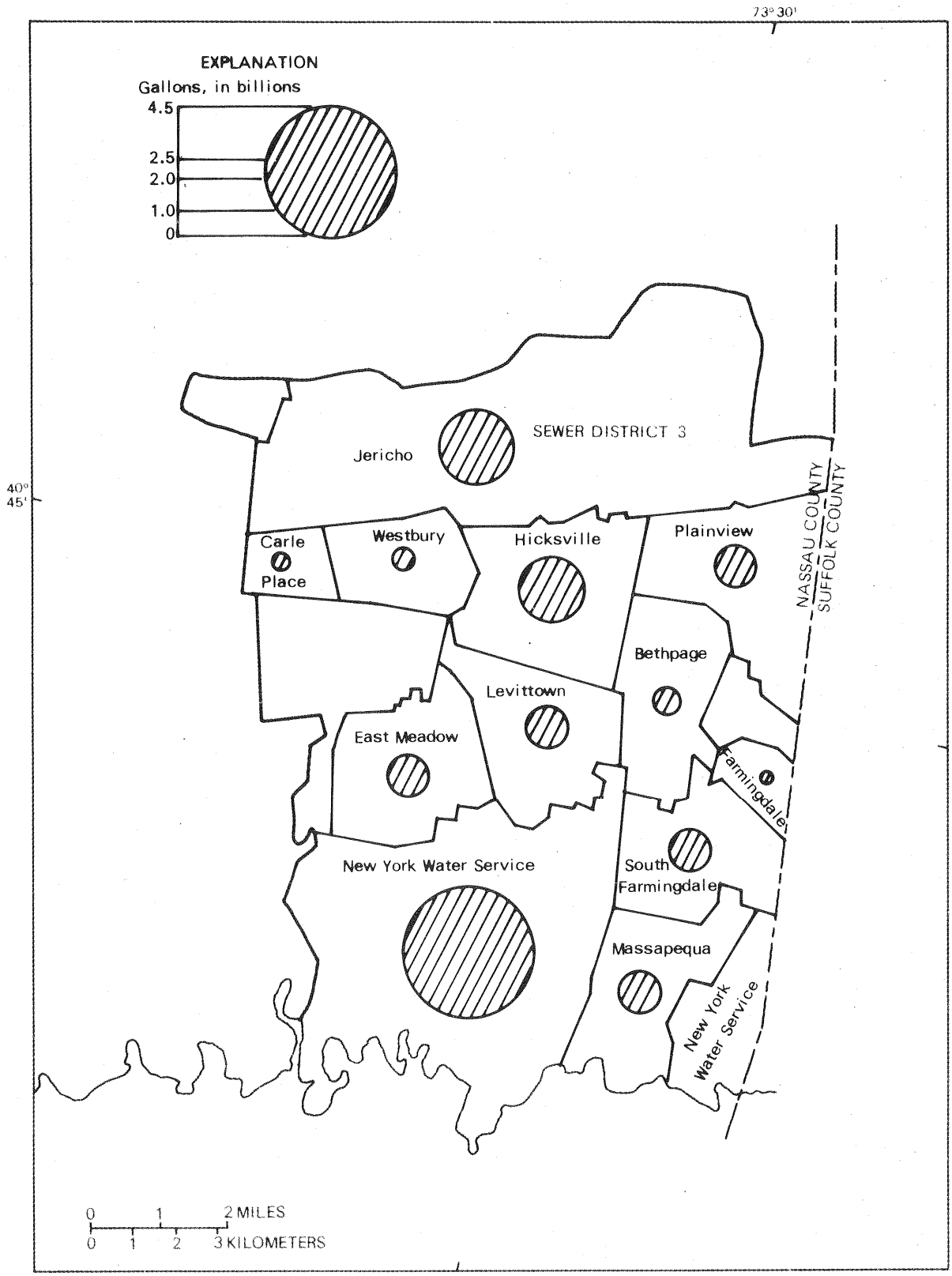


Figure 23.--Water districts in Sewer District 3 and pumpage from each during 1975.

Table 7.--Pumpage from public-supply wells in water districts, southeast Nassau County

[in million gallons per day]

Year	Water District											
	N.Y. Water Service	Massapequa	Farmingdale	So. Farmingdale	East Meadow	Levittown	Bethpage	Hicksville	Plainview	Jericho	Westbury	Carle Place
1950	2.55	-	0.44	-	0.11	2.99	-	1.32	-	1.24	0.86	0.49
1951	3.57	-	.50	-	.60	3.33	1.05	2.31	-	1.77	1.30	.59
1952	4.61	-	.60	-	1.33	3.54	1.40	2.54	-	1.94	1.33	.61
1953	6.15	-	.87	-	1.90	3.72	1.49	3.29	-	2.76	1.69	.71
1954	6.83	0.07	.50	1.10	2.10	3.73	1.48	3.61	0.44	3.02	1.86	.77
1955	7.88	.30	.59	1.43	2.65	5.24	1.81	4.32	1.25	3.41	2.29	.86
1956	7.05	.60	.54	1.66	2.58	4.31	1.74	4.12	1.52	3.22	2.15	.75
1957	8.39	1.17	.64	2.52	3.13	5.73	2.24	5.05	2.08	4.78	2.91	.97
1958	7.71	.87	.62	2.21	2.88	4.16	1.93	4.45	2.00	4.07	2.50	.76
1959	8.77	1.85	.74	2.96	3.36	4.73	2.22	5.41	2.53	5.00	3.07	.90
1960	8.48	1.74	.79	2.97	3.25	4.35	2.19	5.40	2.69	4.97	3.18	.87
1961	7.97	2.44	.85	3.11	3.48	3.90	2.35	5.35	2.93	5.49	2.37	.91
1962	9.14	3.44	.84	3.56	3.77	4.47	2.66	6.09	3.38	6.58	2.52	1.04
1963	9.56	3.64	.76	3.63	3.97	4.92	2.72	6.00	3.72	6.67	3.83	1.12
1964	10.31	3.86	.84	3.89	4.25	5.23	3.04	6.29	4.21	7.70	1.84	1.23
1965	10.56	3.91	.90	3.72	4.22	5.30	3.02	6.58	4.34	9.10	4.48	1.24
1966	11.18	4.00	.93	3.89	4.36	5.55	3.07	6.49	4.40	9.00	4.60	1.27
1967	9.94	3.27	.80	3.36	3.93	4.33	2.60	5.14	3.65	7.55	4.23	1.06
1968	11.25	4.10	.86	3.86	4.36	5.05	2.96	6.20	4.40	8.74	4.40	1.16
1969	11.50	4.19	.80	3.72	4.25	4.75	2.86	6.44	4.19	8.24	3.09	1.17
1970	12.34	4.40	.87	3.93	4.96	4.96	3.13	6.37	4.47	8.52	4.10	1.24
1971	12.63	4.25	.92	4.05	4.84	5.13	3.32	6.63	4.45	9.04	4.14	1.23
1972	12.08	3.58	.96	3.81	4.27	3.89	3.03	5.92	4.41	8.55	3.91	1.29
1973	12.26	4.26	1.02	3.92	3.98	3.84	3.00	6.21	4.59	8.62	4.18	1.34
1974	12.81	4.59	1.11	3.94	4.19	3.95	3.13	5.44	4.56	8.42	3.87	1.37
1975	12.32	4.38	.95	3.60	4.64	3.65	2.83	5.54	4.26	7.55	2.33	1.20
1976	13.46	5.28	.96	3.85	4.48	4.10	2.96	6.05	4.80	8.85	2.52	1.46

New York Water Service (fig. 23), which is the largest supplier in the study area. Between 1950 and 1960, pumpage increased by 5.93 Mgal/d; pumpage between 1960 and 1970 increased by 3.86 Mgal/d; but pumpage since 1970 has increased by only 1.12 Mgal/d. Throughout Sewer District 3, pumpage increased from 10 Mgal/d in 1950 to 53 Mgal/d in 1975, about a fivefold increase.

In 1975, water use ranged from 0.21 (Mgal/d)/mi^2 in the Jericho Water District to 0.91 (Mgal/d)/mi^2 in the Carle Place Water District. Average water use among the districts was 0.5 (Mgal/d)/mi^2. When sewer installations are completed, most of the water use will be consumptive because approximately 85 percent of the pumped water will be routed to sewer lines. The rest will be used for lawn sprinkling and other outdoor use, and part of it will infiltrate back to the water table. By 1985, water use in Sewer District 3 is expected to range from 0.21 (Mgal/d)/mi^2 in the Jericho Water District to 1.69 (Mgal/d)/mi^2 in the Westbury Water District. These estimates are derived from pumpage figures given in Kimmel and others (1977). Average water use by 1985 is expected to be 0.94 (Mgal/d)/mi^2.

Water Loss

Greeley and Hansen (1971, p. 84) estimated water loss (including sewage disposal, evapotranspiration from sprinkling, and consumptive losses) in each water district for 1990. If specific yield of 20 percent is assumed for the water-table aquifer in Sewer District 3, the average water-level decline in response to the estimated hydrologic losses would range from 3.1 ft to 17 ft. Water-level declines in response to losses from storage are predicted to be slightly greater than the 3-ft to 16-ft decline predicted by the analog-model studies of Ku and others (1977), which take into account subsurface outflow from district to district, streamflow decreases, and lower population predictions.

Water Quality

The quality of the public-water supply of Nassau County is monitored by the Nassau County Department of Health, as well as by the various water suppliers. Records for 11 public-supply wells in the area having extensive water-quality data and suitable areal distribution were used to compute the trend of nitrate, chloride, and total solids with time. Trend lines were fitted through data points by the least-square method of analysis. Figure 24 shows that concentrations of nitrate (as N), chloride, and total solids increased from the 1950's to 1973 at the 11 selected wells. Smith and Baier (1969) state that water from 24 percent of the public-supply wells in Nassau County had increasing nitrate trends in 1969 and that the nitrate (as N) concentration of water from 16 percent of the public-supply well will exceed the drinking-water limit of 10 mg/L within 50 years. Effluent from cesspools is cited as the primary source of nitrate in the Nassau County Water Supply.

Sections showing vertical distribution of nitrate, chloride, and total-solids concentrations indicate that these constituents have moved downward into the aquifers in a range from tens of feet to a few hundred feet from the 1950's to 1976 (Ku and Sulam, 1976).

Perlmutter and Koch (1972) have shown that most Magothy aquifer wells whose water has a significantly increasing nitrate concentration lie in a central band running east-west across Nassau County. This is because under natural conditions the vertical (downward) movement of water in the vicinity of the major ground-water divide is more rapid than in other parts of the study area. As a result, elevated concentrations of nitrate and other constituents of ground water tend to lie at greater depths near the divide than elsewhere.

The rate of vertical movement of water near the ground-water divide is estimated to be 5 to 25 ft per year and to average 10 ft per year (Perlmutter and Koch, 1972). At this rate, water would move 500 ft from the water table to the base of the Magothy aquifer in about 50 years. Using a steady-state electric-analog model, Franke and Cohen (1972) estimated that it would take 100 years for water to move from the water table to the base of the Magothy aquifer (500 ft) along the Nassau-Suffolk County boundary at the ground-water divide. However, the rates of vertical movement would be accelerated by pumping.

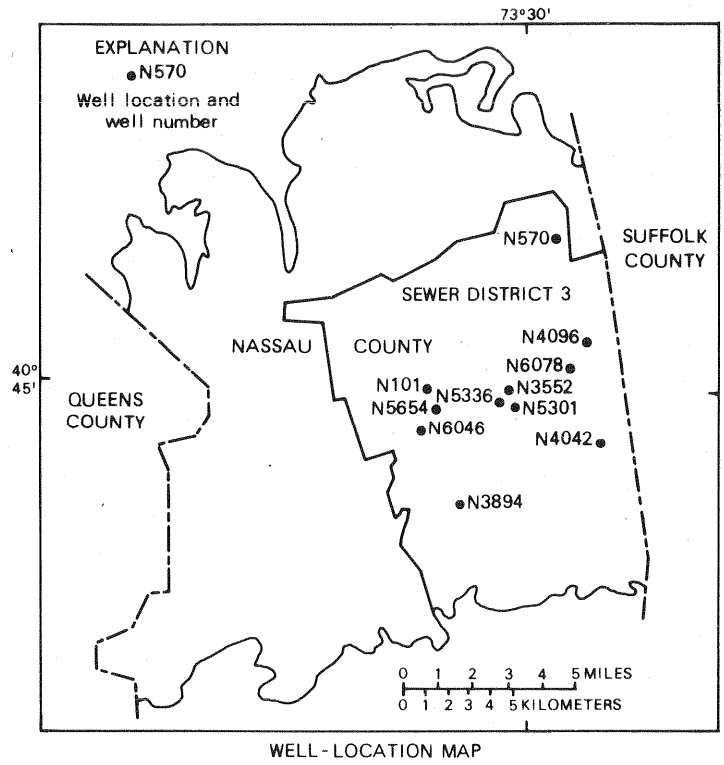
In areas of Hicksville and Levittown, large-scale farming and associated use of fertilizers since 1920 (Perlmutter and Koch, 1972) has undoubtedly contributed nitrate to the ground-water system. More recently, fertilizers applied to lawns and gardens have become sources of nitrate in ground water.

The lowest concentrations of nitrate, chloride, and total solids in the Magothy aquifer are south of a line running from North Merrick to South Farmingdale (fig. 1).

Median nitrate (as N) concentrations of untreated water from all public-supply wells in the water districts and villages in Sewer District 3 ranged from 0.02 mg/L to 4.0 mg/L (table 8). The pH of untreated public-supply water ranged from 5.1 to 6.7. Specific conductance ranged from 35 to 120 μmho/cm, which indicates that the water has a low mineral content.

Iron and manganese enter ground water as a result of bacterial action or the solvent action of water on minerals or manmade products containing these elements. Iron is ubiquitous in ground water on Long Island. However, manganese in ground water is usually attributed to bacterial action at shallow depths. Manganese was virtually absent in public-supply wells in Sewer District 3 (table 8), whereas iron concentrations ranged from 0 to 0.49 mg/L. Pluhowski and Kantrowitz (1964) found that iron in excess of 0.3 mg/L with an absence of manganese can occur in all aquifers underlying Long Island and is probably the result of the solution of iron-bearing minerals or iron oxide within the aquifer.

Median hardness of water (as $CaCO_3$) differs greatly from well to well and ranged from 6 to 32 mg/L during the 3-year study. In water districts where hardness (as $CaCO_3$) was less than 10 mg/L, ion exchange resulting from water percolating through clay lenses in the aquifer was the most likely contributing factor (Pluhowski and Kantrowitz, 1964, p. 56).



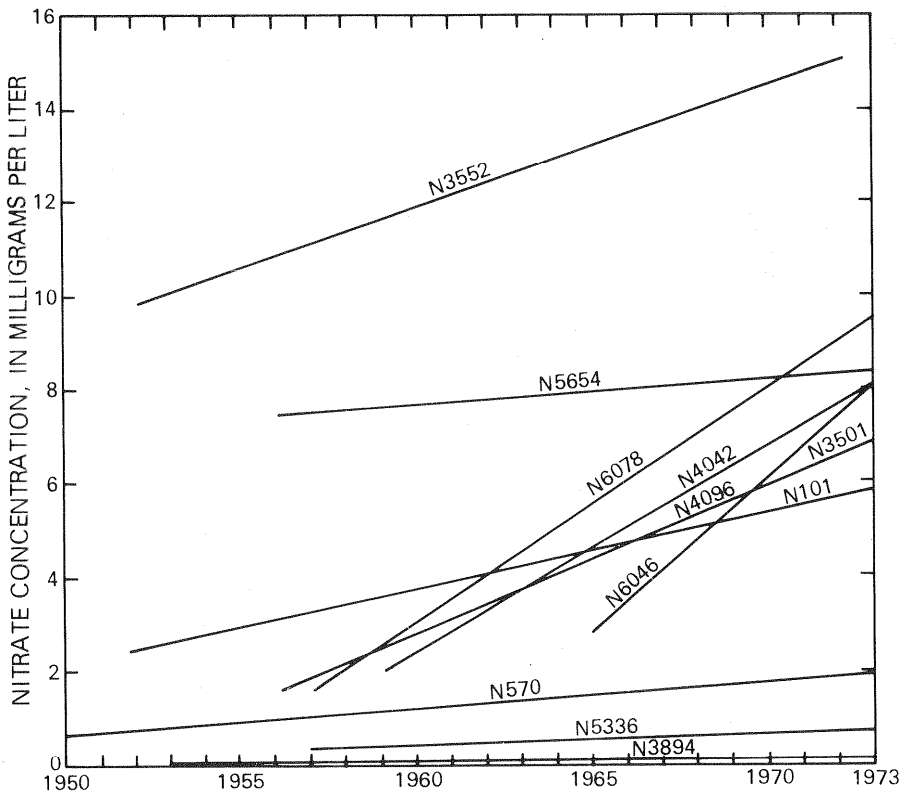
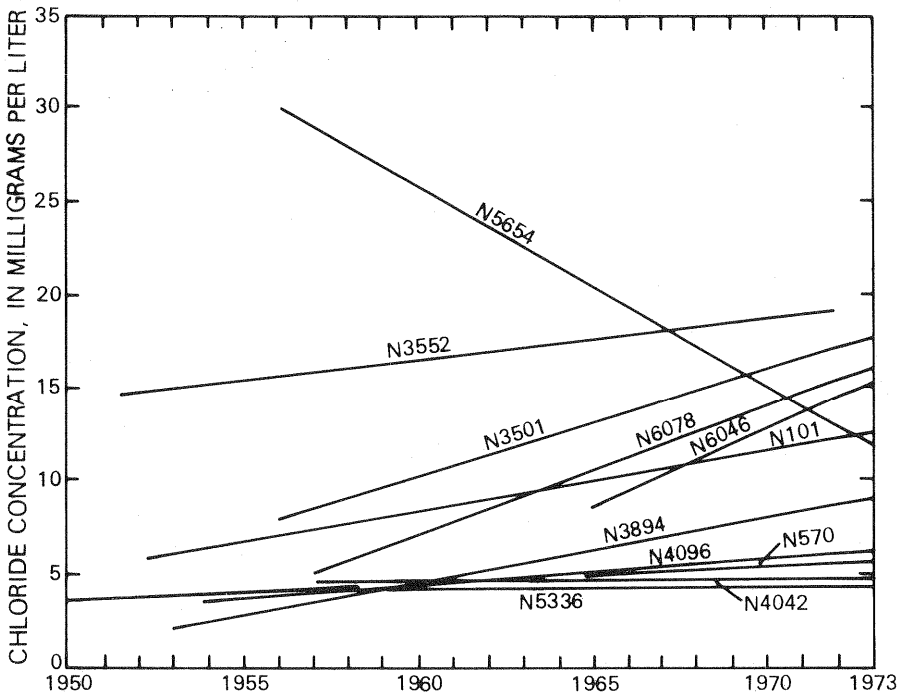


Figure 24.--Trend of nitrate in well water in Sewer District 3, 1950's through 1973. (From Ku and Sulam, 1976.)



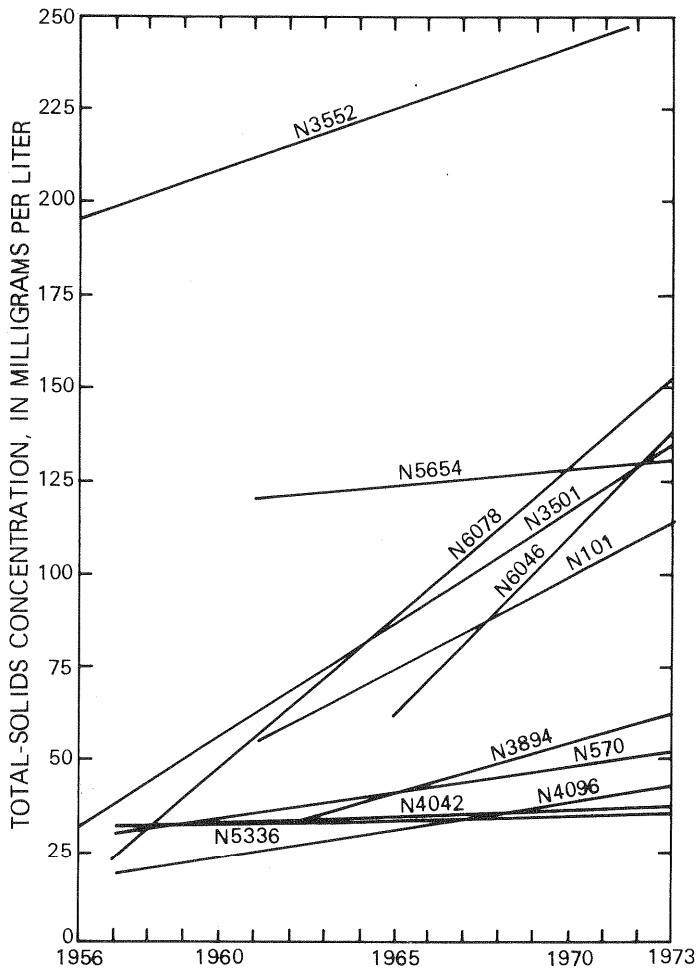


Figure 24 (continued).--Trends of chloride and total-solids concentration in well water in Sewer District 3, 1950's through 1973. (From Ku and Sulam, 1976.)

Table 8.--Range and median values of chemical concentration in untreated water from public-supply wells in Sewer District 3, Nassau County, New York, 1974

[Concentrations in milligrams per liter. Upper numbers indicate minimum and maximum concentration; lower number is median value.]

Constituent or characteristic	Water District					
	Bethpage	Carle Place	East Meadow	Farmingdale	Hicksville	Jericho
Number of wells sampled	8	5	11	3	17	21
Alkalinity, Total (as $CaCO_3$)	1.0-4.0 3.0	4.0-17 10	1.0-5.0 3.0	1.0-2.0 2.0	2.0-19 7.0	3.0-28 11
Chloride, dissolved	3.6-18.6 4.3	5.8-22 9.8	3.4-19.8 5.4	5.2-10.2 9.8	3.4-34 8.0	4.2-44 7.0
Detergents (MBAS)	0-0 0	0-0 0	0-0 0	0-0 0	0-0 0	0-0 0
Hardness ($CaCO_3$)	2-60 6	14-104 32	4-50 10	4-14 10	4-100 14	4-80 18
Iron, dissolved	0.0-0.26 0.08	0.0-0.14 0.0	0.0-2.8 0.19	0.0-0.13 0.09	0.0-6.2 0.0	0.0-0.22 0.07
Manganese, total	0-0 0	0-0 0	0-0.12 0	0-0 0	0-0.66 0	0-0.18 0
Nitrogen (NH_4 as N)	0.002-0.002 0.002	0.001-0.002 0.002	0.002-0.032 0.002	0.002-0.002 0.002	0.002-0.350 0.002	0.002-0.500 0.002
Nitrogen (NO_3 as N)	0.04-13.2 0.23	.36-11 4.0	0.01-9.5 .55	0.05-3.45 2.8	0.09-17.4 3.1	0.03-5.0 1.46
Oxygen, dissolved	1.8-8.2 5.4	6.0-7.6 6.4	0-8.2 3.8	2.2-6.6 6.2	1.6-9.2 7.8	5.6-10.8 9.2
pH, Laboratory	5.1-5.9 5.7	5.6-7.4 6.7	4.7-6.0 5.3	4.8-5.3 5.2	5.4-6.6 6.1	5.7-6.6 6.2
Phosphate Ortho, total as P	0.0-0.06 0.02	0-0.06 0.03	0-0.03 0.01	0-0.02 0	0-0.07 .01	0-0.03 0
Phosphorus, total as P	0.02-0.26 0.02	0-0.6 0.02	0-.04 0.01	0-.42 0.02	0-.30 0.0	0-.06 0.02
Sodium, dissolved	0.0-16 4.0	6.0-13 9.0	4.0-21 7.0	0.0-7.0 7.0	3.0-27 6.0	3.0-29 6.0
Specific conductance, Laboratory (µmho/cm @ 25°C)	30-225 35	60-305 120	35-210 50	35-85 85	30-390 90	35-345 60
Total solids	23-193 37	48-305 100	24-168 48	49-81 68	16-354 76	20-203 71

Analyses by Nassau County Department of Health.

Table 8.--(Continued)

Constituent or characteristic	Water District					
	Levit-town	Massa-pequa	N.Y. Water Service	Plain-view	So. Farm-ingdale	West-bury
Number of wells sampled	14	8	18	11	12	10
Alkalinity, Total (as $CaCO_3$)	1.0-18 4.0	1.0-6.0 1.0	1.0-8.0 2.0	1.0-11 2.0	1.0-4.0 3.0	4.0-10 6.5
Chloride, dissolved	3.6-15.4 5.8	3.0-19 3.9	4.0-15.4 5.8	3.2-10.8 5.8	2.8-29 5.0	3.8-16 9.0
Detergents (MBAS)	0-0 0	0-0	0-0.5 0	0-0 0	0-0 0	0-0 0
Hardness ($CaCO_3$)	4-32 8	4-38 6	2-64 8	4-24 10	4-44 7	6-48 20
Iron, dissolved	0.0-0.65 0.08	0.19-1.47 0.41	0.0-2.09 0.32	0-18 0.1	0.08-2.22 0.49	0-0.39 0.07
Manganese, total	0-0 0	0-0.09 0	0-0.71 0	0-0 0	0-0.25 0	0-0 0
Nitrogen (NH_4 as N)	0.002-0.004 0.002	0.002-0.006 0.002	0.002-0.7 0.002	0.002-0.002 0.002	0.002-0.170 0.002	0.002-0.78 0.02
Nitrogen (NO_3 as N)	0.0-7.8 .41	0.01-0.04 0.03	0.0-13.8 0.07	.42-4.1 1.2	0-6.9 0.02	.05-4.1 4
Oxygen, dissolved	0.4-7.8 6.2	0-.2 0.0	0-1.0 0.2	6.0-10.7 8.6	0.2-4.8 0.2	6.2-9.6 8.3
pH, Laboratory	5.0-6.7 5.7	4.6-6.2 5.2	4.2-5.6 5.2	4.9-6.9 5.8	4.4-5.7 5.1	5.5-6.4 6.1
Phosphate Ortho, total as P	0-0.02 0	0-0.06 .02	0-0.03 0	0-0.06 .02	0-0.1 0	0-0.01 0
Phosphorus, total as P	0-0.3 0.5	0.06-2.7 0.5	0-0.03 0	0-0.06 0.02	0-1.9 0.1	0-0.04 0.02
Sodium, dissolved	3.0-12 5.5	0-9.0 5.0	0-0.04 0.02	0-8.0 4.0	0-17 4.5	0-13 7.0
Specific conductance, Laboratory (µmho/cm @ 25°C)	30-155 40	35-155 45	30-300 50	35-110 50	30-205 45	45-160 95
Total solids	14-150 57	24-154 60	13-250 52	18-107 56	28-148 36	40-115 82

STREAMFLOW

Sewer District 3 contains three major southward flowing streams--East Meadow Brook, Bellmore Creek, and Massapequa Creek (fig. 1). Although streamflow in Sewer District 3 does not provide water for domestic or commercial use, the streams have esthetic value because they flow through parks and form lakes along their course.

Effect of Sewerage

The high permeability of the soil and low relief of the land surface allow rain to infiltrate into the ground almost immediately; therefore, stream flooding is rare. Under natural conditions, 95 percent of the streamflow on Long Island is derived from ground water (Cohen and others, 1968, p. 62). However, the flow regime has been modified by storm sewers, which carry storm runoff both to recharge basins, where the water table is deep, and directly to streams, where the water table is shallow. Direct (storm) runoff into East Meadow Brook has increased 270 percent from 1937-62 as a result of urbanization (Seaburn, 1969), although part of the increase may have been due to increased precipitation during that period. The base flow (ground-water discharge into streams) was reduced by 2 percent during that time, and the total runoff (base flow plus direct runoff) increased by 8 percent. A later study by Greely and Hansen (1971, p. 64) shows that in Sewer District 2, direct runoff can account for as much as 50 percent of total runoff.

After the completion of sanitary sewers in Sewer District 2 in 1953, streamflow was altered as sewers intercepted the water that previously had been returned to the water-table aquifer through cesspools and septic tanks. Garber and Sulam (1976) showed that from 1953 to 1972 the average annual flow at Pines Brook (fig. 1) in the sewered area of Nassau County decreased by 2.5 ft^3/s, whereas Massapequa Creek, in the unsewered area, was unaffected. Installation of sanitary sewers is believed to be the major factor in the decreased flow.

The effect of sewerage in Sewer District 3 on annual streamflow within that District was simulated on an electric-analog model of Long Island in conjunction with simulation of the effect of sewerage on the general hydrologic system (Ku and others, 1977). That study predicted that sewerage in Sewer District 3 would cause a 60-percent reduction in annual streamflow at the mouth of the streams in the District and that the reduction in streamflow throughout the affected area after the completion of sewerage would be 40 percent of the 1977 streamflow. Any additional sewerage in nearby areas will, of course, further reduce the amount of streamflow.

Stream Discharge

Flow-duration curves are cumulative frequency curves that show the percentage of time that specified discharges have been equaled or exceeded; they are useful in analyzing the amount and variability of flow within individual streams and also in comparing one stream with another. Figures 25-28 depict the flow in three streams in Sewer District 3. The lower end of the curve indicates low-flow characteristics. For example, a flat curve, which is representative of Long Island streams, indicates that a stream steadily

receives a large amount of ground water; a steep curve indicates a "flashy" stream--one subject to very high and low flows.

Low-flow-frequency curves, which indicate the probability of occurrence of given minimum annual consecutive-day discharges, were also used in this study. Flow-duration curves and low-flow-frequency curves for Massapequa Creek, Bellmore Creek, East Meadow Brook, and Pines Brook are shown in figures 25-28. Pines Brook is in Sewer District 2; its flow statistics are presented for comparison with statistics on streamflow in the unsewered Sewer District 3. Tables 9-12 (p. 66-67) present data on these flow characteristics of the same streams as determined from gaging-station records. During the period of record ending in 1975, the 30-day, 10-year low flow in the study area ranged from 0.04 $(ft^3/s)/mi^2$ to 0.16 $(ft^3/s)/mi^2$. The lowest 30-day 10-year low flow--0.04 $(ft^3/s)/mi^2$--was recorded at East Meadow Brook, which lies along the boundary of Sewer Districts 2 and 3. Seaburn (1969) concluded that the flow in this stream is affected by urbanization. In the sewered area, represented by Pines Brook, the 30-day, 10-year low flow is zero. The drought of 1962-66 complicates the low-flow analysis in that the drought considerably modified the low-flow-frequency curves and the lower end of the flow-duration curves, as indicated in figures 25 to 28. Records ending in 1960 represent the predrought period, whereas the period of record ending in 1975 includes the drought.

The low-flow-frequency curves for each stream (figs. 25-28) show that the lowest average flows during periods of 1, 7, and 30 consecutive days, at recurrence intervals of 2 years or more, were during the longer period, which included the years of the drought. For example, before the drought, the average flow during the 7-consecutive day periods of lowest flow was equal to or less than:

3.5 ft^3/s at Massapequa Creek;
2.6 ft^3/s at Bellmore Creek;
6.2 ft^3/s at East Meadow Brook; and
0.5 ft^3/s at Pines Brook,

at recurrence intervals averaging 10 years. In contrast, the corresponding flows during the period of record that includes the drought were:

2.5 ft^3/s at Massapequa Creek;
1.9 ft^3/s at Bellmore Creek;
0.7 ft^3/s at East Meadow Brook; and
zero at Pines Brook,

at recurrence intervals averaging 10 years.

The flow-duration curves for Pines Brook reflect the fact that the stream was affected by both sewerage and the drought and, to a small extent, by pumping in adjacent Queens County (fig. 28). The flow-duration curve for 1938-52 at Pines Brook, which represents flow characteristics before either the drought of 1962-66 or the installation of sewers, shows the highest flow of the period of record. The curve for Pines Brook during the 1938-60 represents both predrought conditions and 6 years of sewerage effects, and the curve for 1938-75 includes the periods before sewerage, after sewerage, and

the drought years. The sharp downward trend of the 1938-75 curve after the 50-percent-duration point reflects the effects of the drought and sewerage. The curve for 1954-75 includes the drought and the period of sewerage and reflects these effects in the steepest downward trend and lowest flow of any periods. On the basis of analog-model prediction and the historical record from Pines Brook, it can be assumed that streamflow in Sewer District 3 will be similarly affected by sewerage.

Stream length is another factor affected by sewerage. The point at which streamflow begins indicates where the water table intersects land surface. When the water-table is lowered, from sewerage or drought, for example, the start of flow will move downstream, and the stream will be shortened.

Several field determinations of the start of flow have been done on Long Island. Table 13 (p. 68) lists four streams and the location of start of flow, the date the observations were made, and flow duration (percent chance of recurrence) of Nissequogue River near Smithtown (fig. 1). Nissequogue River (fig. 29) was selected as a standard reference because it has little or no streamflow regulation and has an essentially complete record. When sewer construction is completed in Sewer District 3, the length of each stream may be observed at periods when the Nissequogue River is at the reference duration flows (table 13). The observed stream lengths may then be compared with those listed in table 13 to reveal the effect of sewerage on stream length. For example, the start of flow at Massapequa Creek on April 22, 1969 (table 13) was 9,500 ft above the gage (on this date Nissequogue flow-duration point was at 75 percent). After the sewers have been completed and when the flow at Nissequogue River is again at 75-percent duration, the point at which the flow of Massapequa Creek begins would be measured and the difference in stream length between the two measurements could be calculated. If all other factors are the same, the reduction in stream length can be attributed to the effect of sewerage.

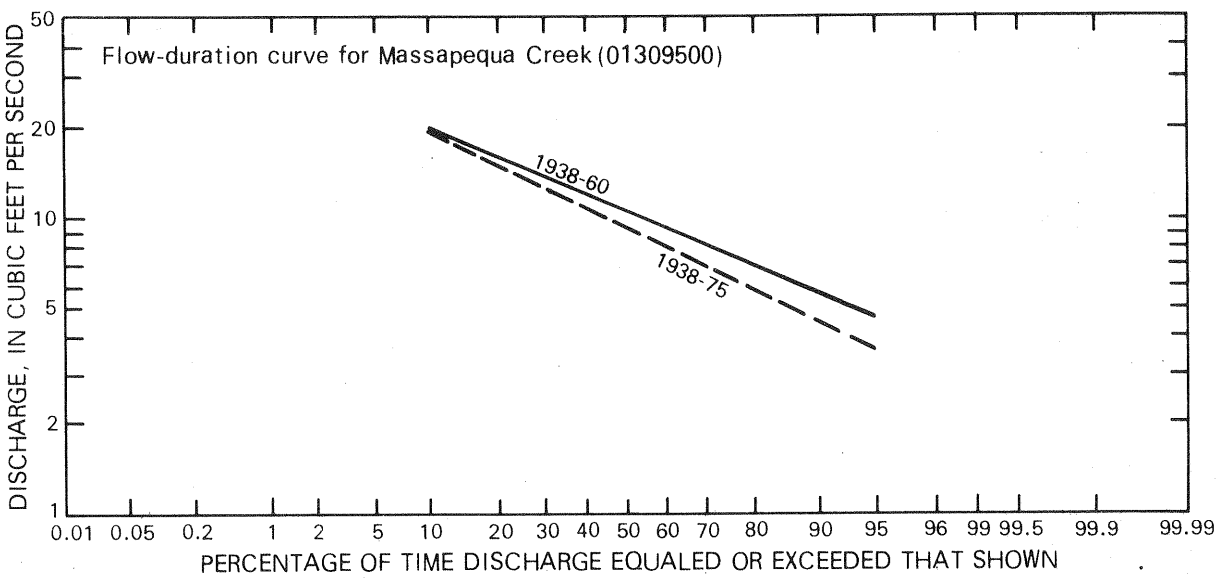
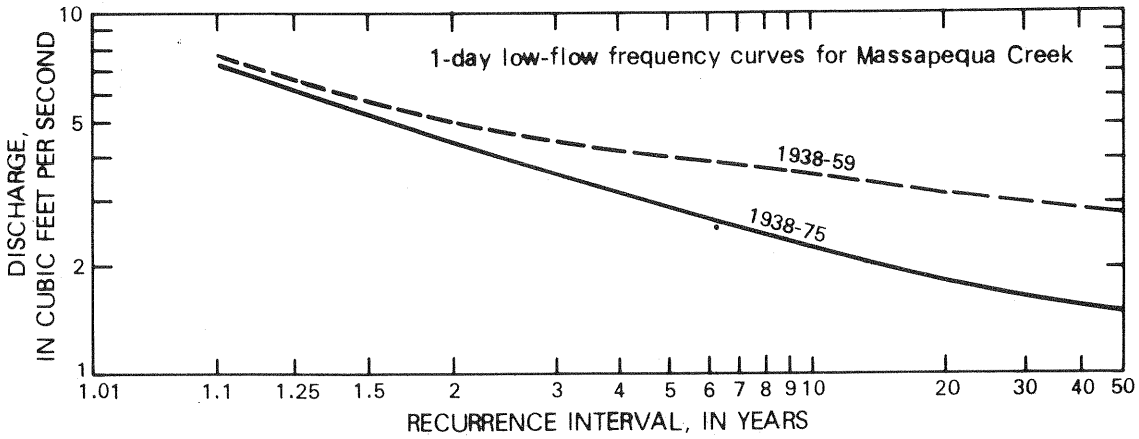
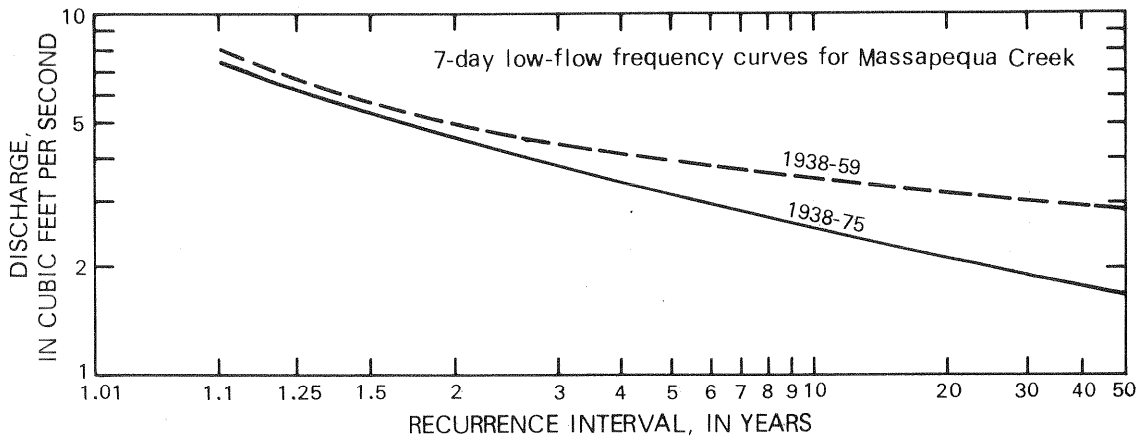


Figure 25.--Flow-duration curve, Massapequa Creek at Massapequa.





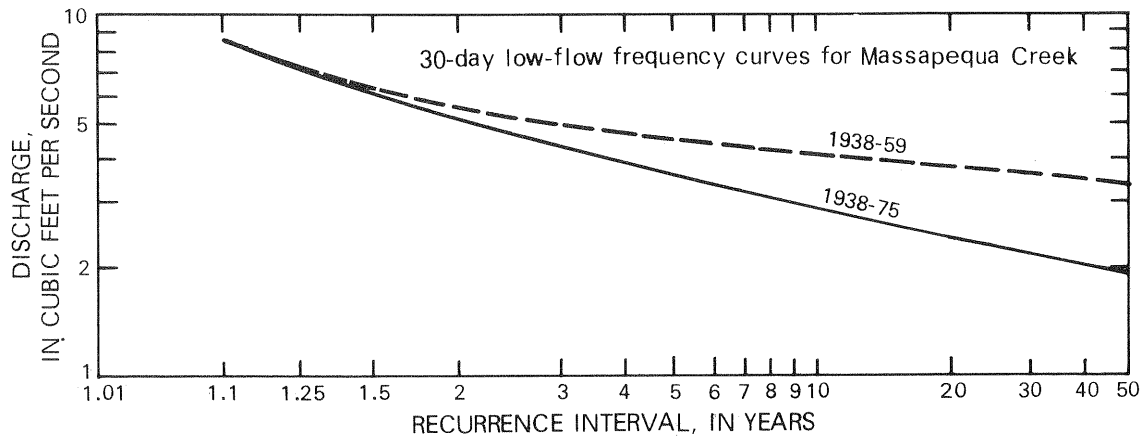
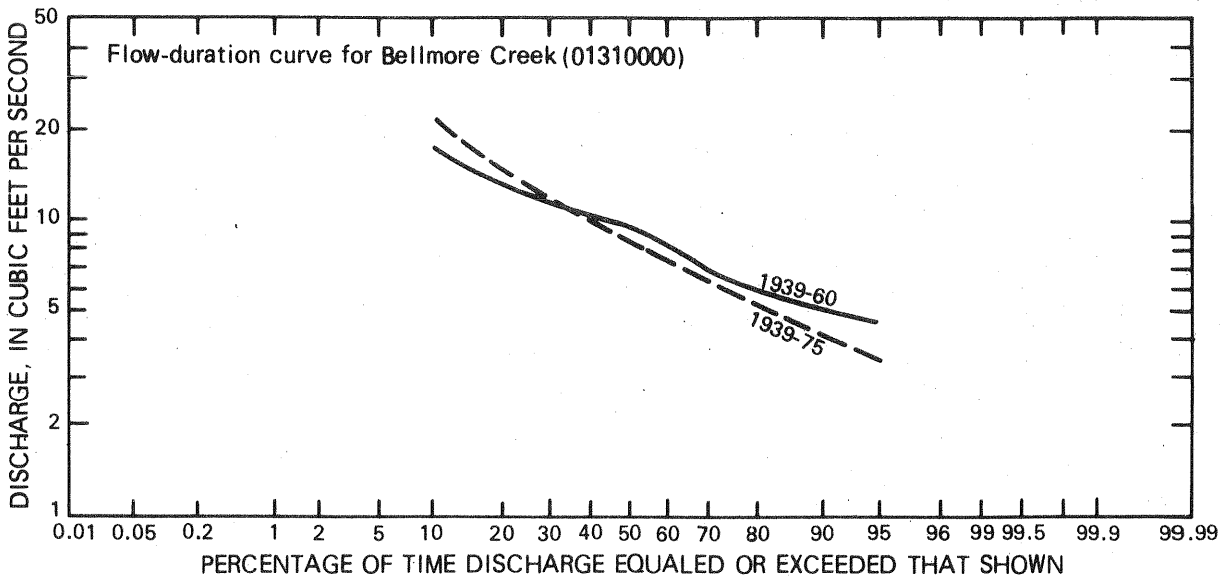
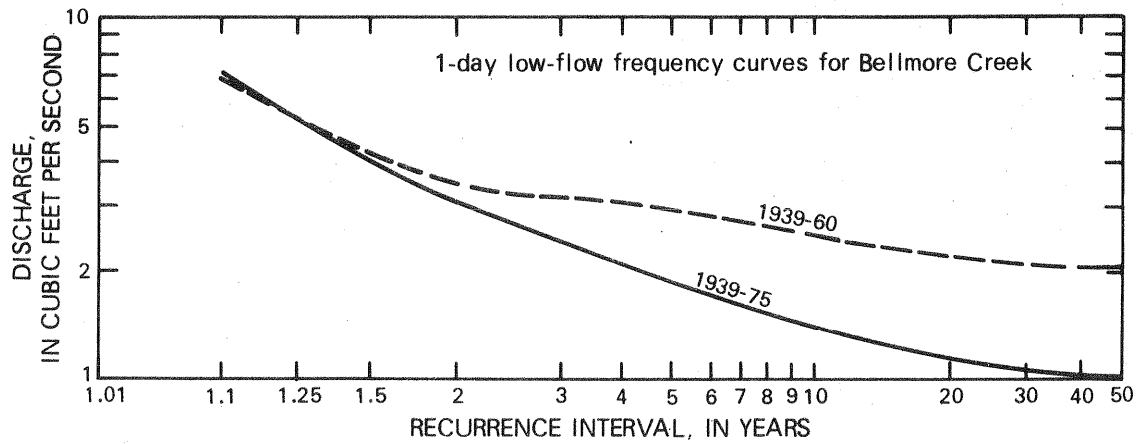


Figure 25 (continued).--Low-flow frequency curves, Massapequa Creek at Massapequa.





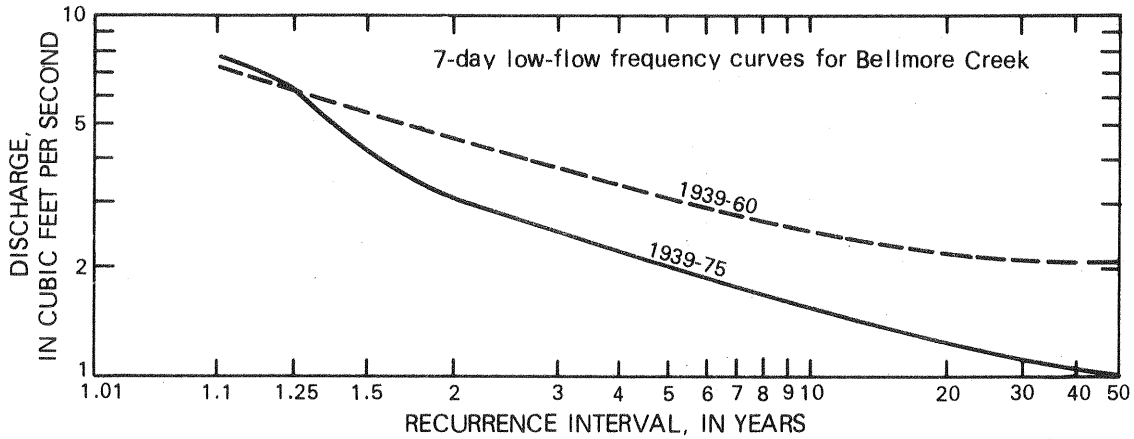


Figure 26.--Flow-duration and low-flow frequency curves, Bellmore Creek at Bellmore.

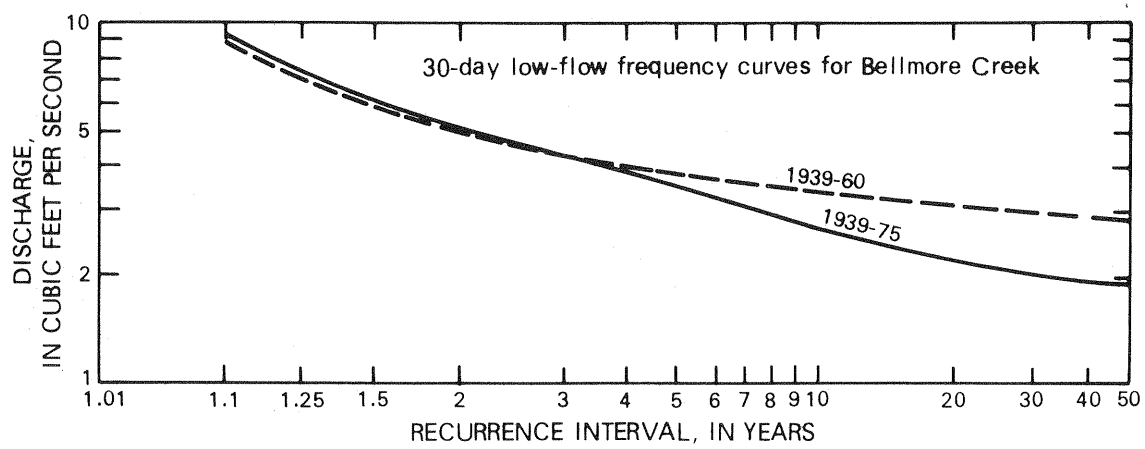


Figure 26 (continued).--Low-flow frequency curve, Bellmore Creek at Bellmore.

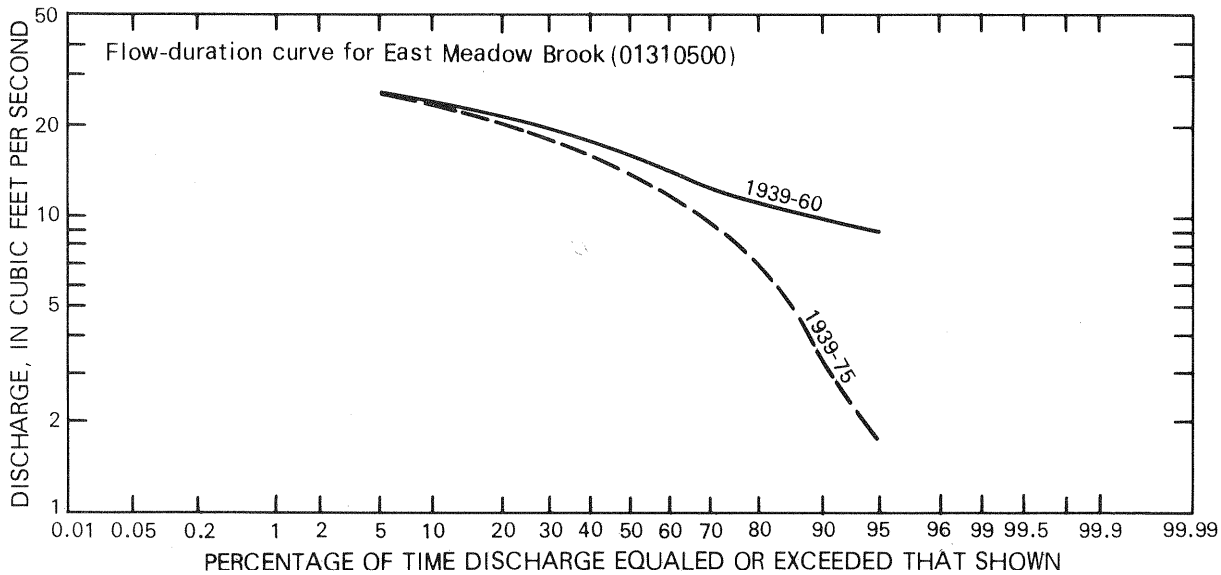
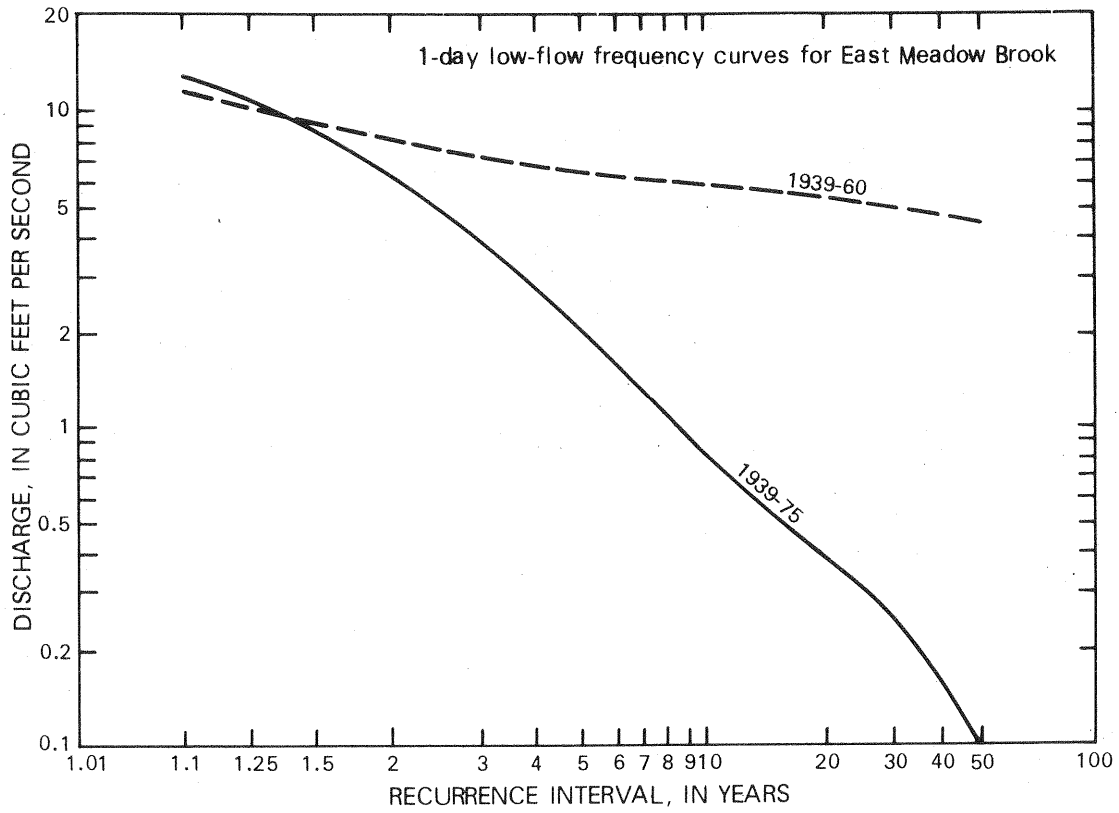


Figure 27.--Flow-duration curves, East Meadow Brook at Freeport.



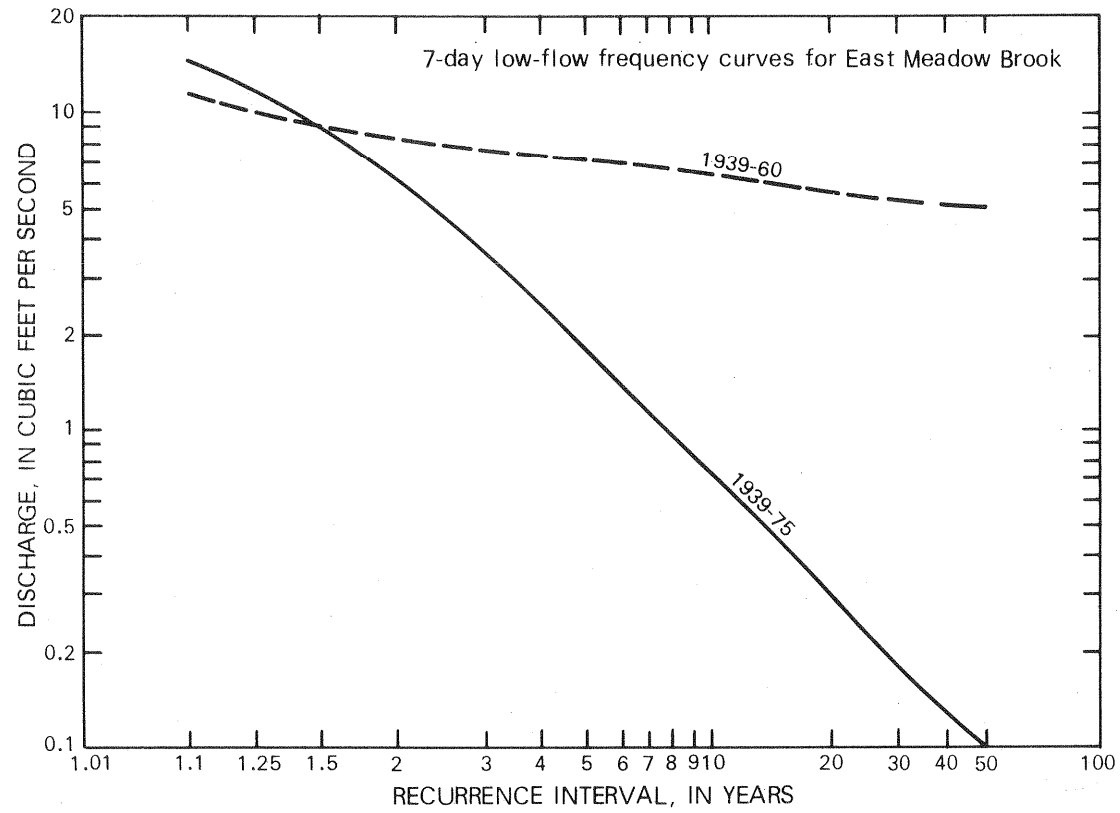


Figure 27 (continued).--Low-flow frequency curves, East Meadow Brook at Freeport.

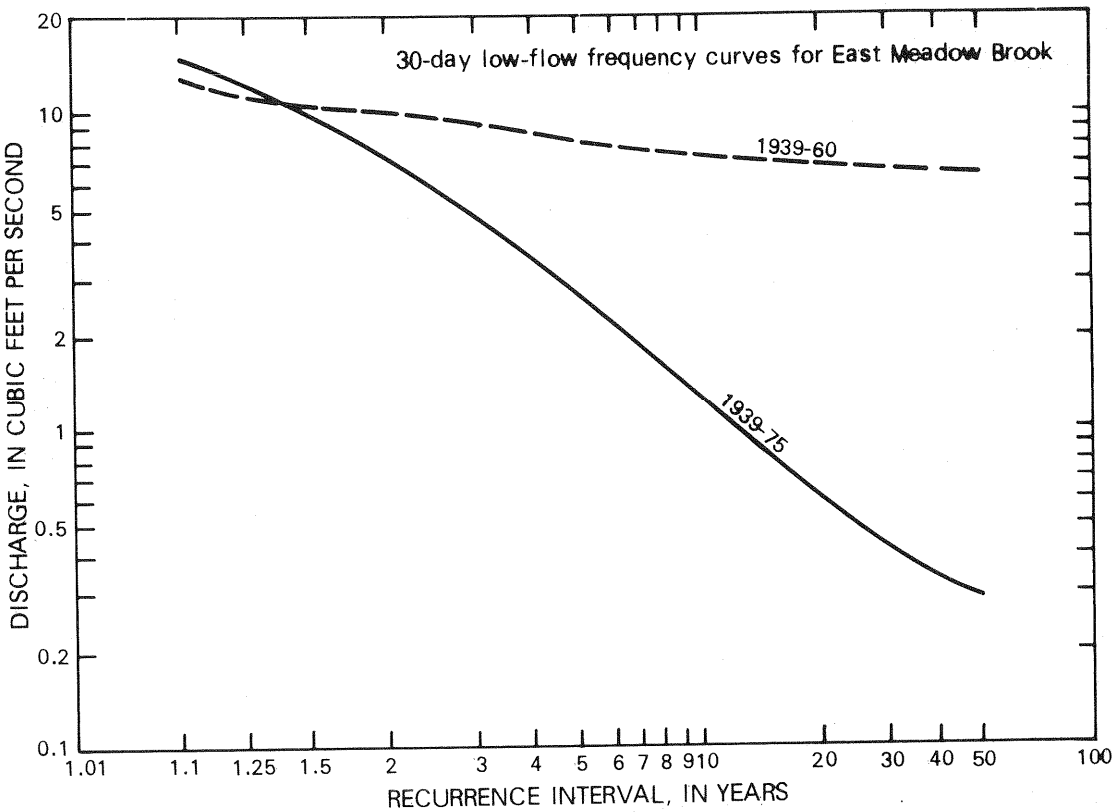


Figure 27 (continued).--Low-flow frequency curve, East Meadow Brook at Freeport.

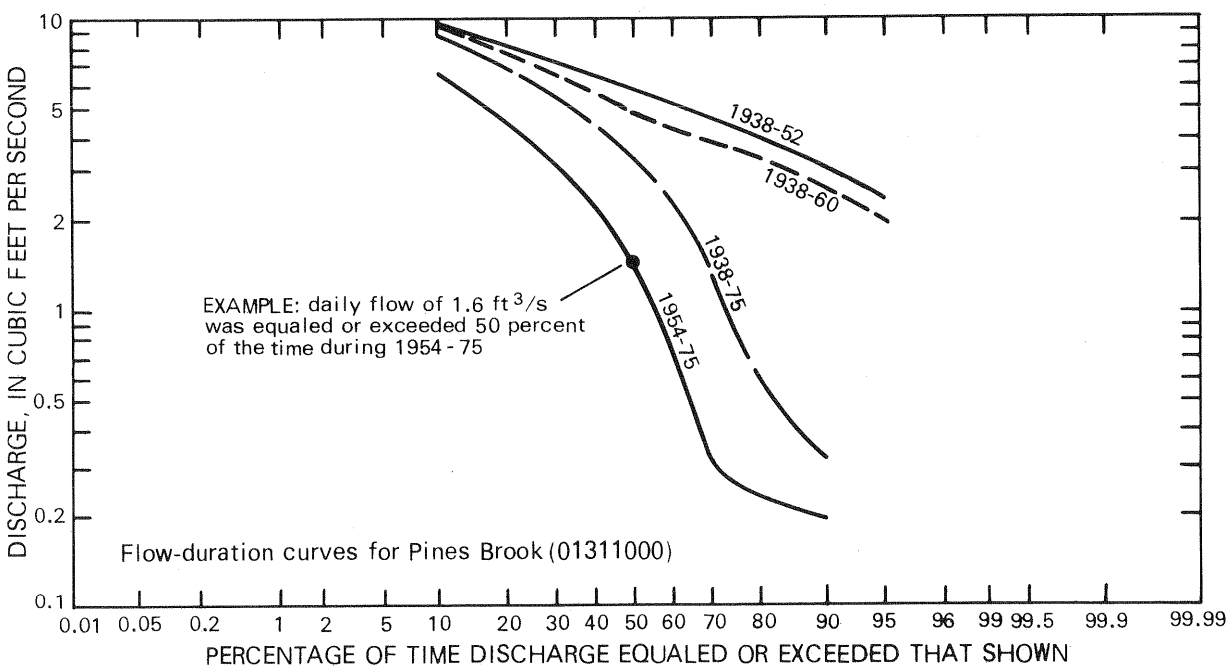
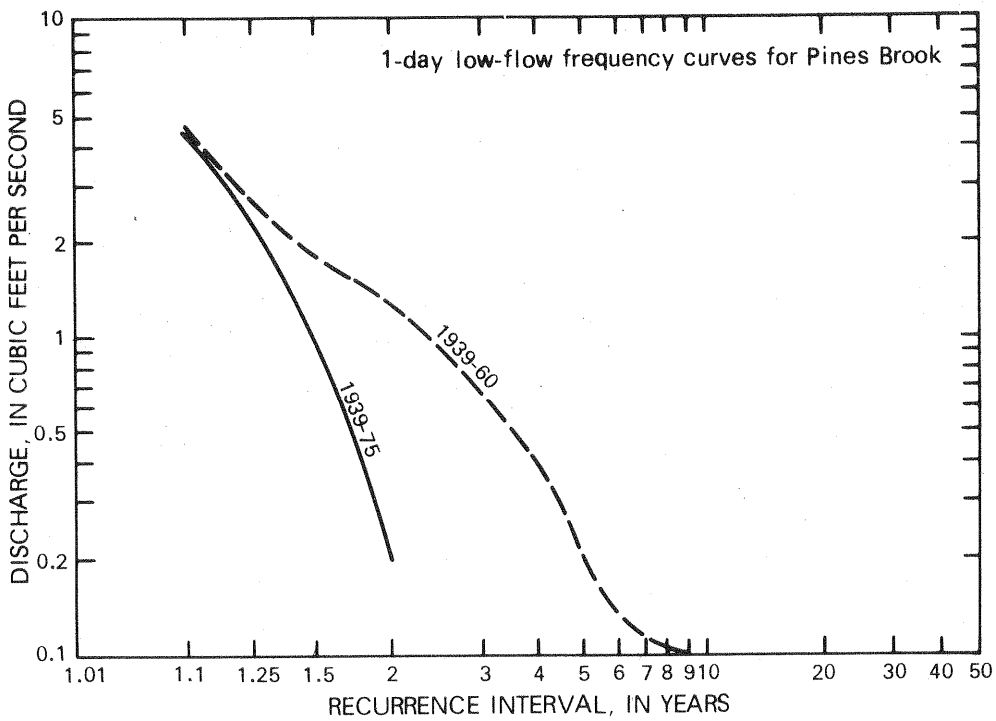


Figure 28.--Flow-duration curve, Pines Brook at Malverne.



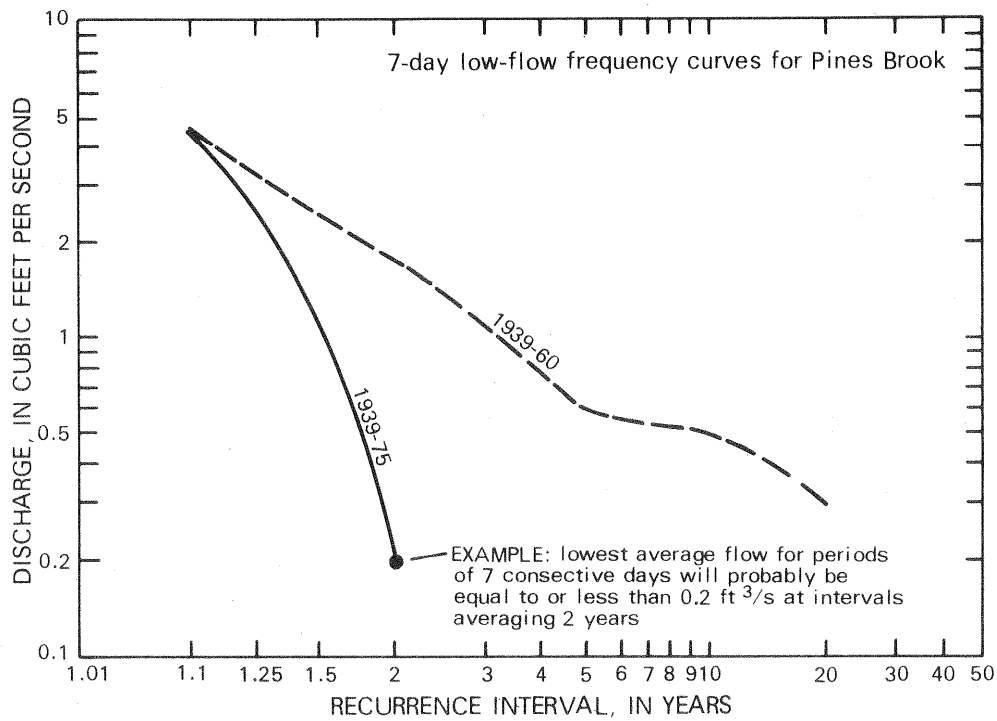


Figure 28 (continued).--Low-flow frequency curves, Pines Brook at Malverne.

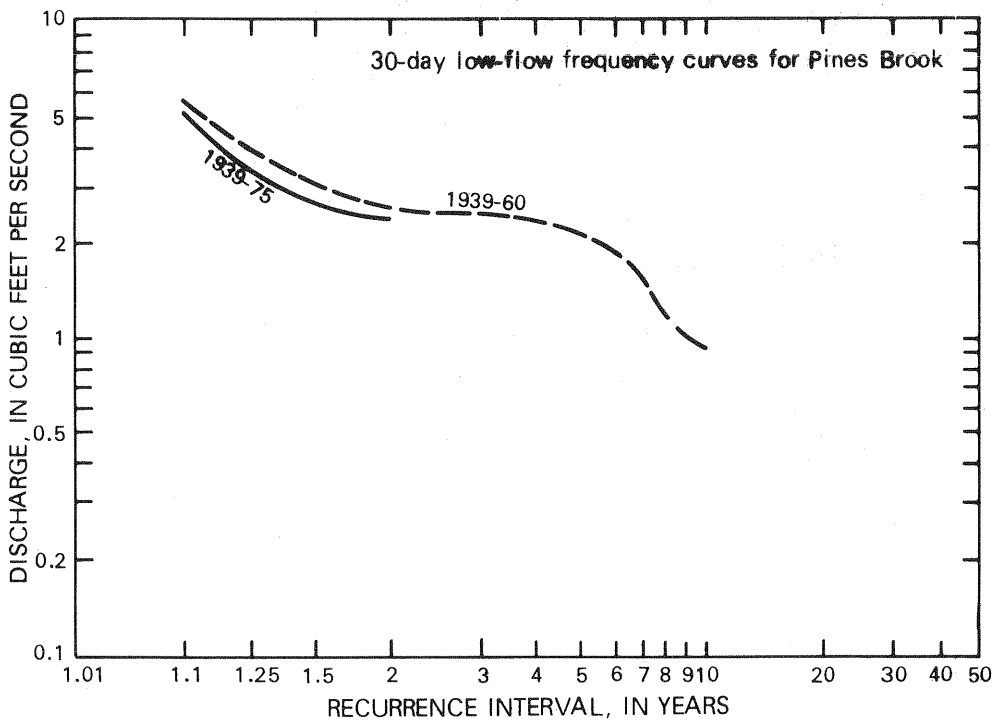


Figure 28 (continued).--Low-flow frequency curve, Pines Brook at Malverne.

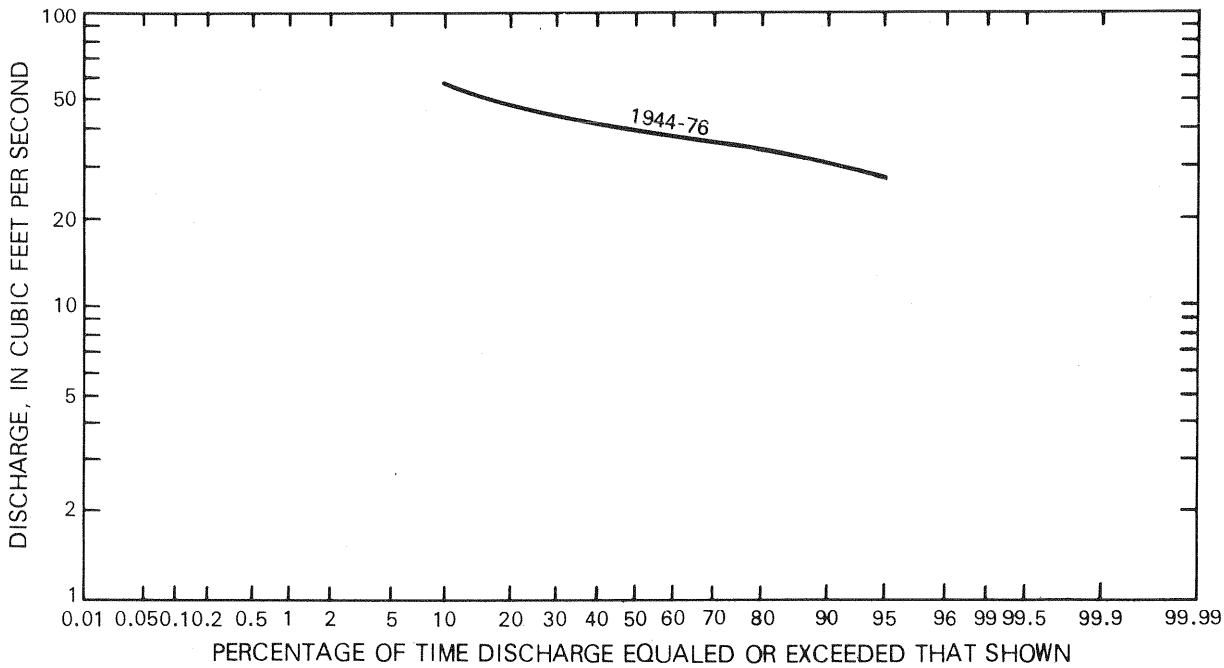


Figure 29.--Flow-duration curve, Nissequogue River near Smithtown.

*Table 9.--Streamflow characteristics, Massapequa Creek at Massapequa**

LOW-FLOW FREQUENCY						
	Average discharge during selected consecutive-day intervals (in cubic feet per second)					
Recurrence interval (years)	1938-75			1938-1959		
	1-day	7-day	30-day	1-day	7-day	30-day
1.1	7.5	7.6	8.8	7.7	8.0	8.7
1.25	6.3	6.5	7.5	6.6	6.8	7.6
2.0	4.3	4.6	5.3	4.9	5.1	5.9
5	2.9	3.1	3.6	3.7	4.0	4.6
10	2.3	2.5	2.9	3.2	3.5	4.1
20	1.9	2.1	2.4	2.9	3.2	3.8
50	1.6	1.7	1.9	2.5	2.9	3.4

DURATION OF DAILY FLOW							
Period	Percentage of time discharge equaled or exceeded						
	10	25	50	70	75	90	95
	DISCHARGE, IN FT^3/S						
1938-75	20	14	9.5	7.0	6.3	4.3	3.6
1938-60	20	15	11	8.3	7.6	5.8	4.8

*Station 01309500

*Table 10.--Streamflow characteristics, Bellmore Creek at Bellmore**

LOW-FLOW FREQUENCY						
	Average discharge during selected consecutive-day intervals (in cubic feet per second)					
Recurrence interval (years)	1939-1975			1939-1960		
	1-day	7-day	30-day	1-day	7-day	30-day
1.1	7.1	7.9	9.3	6.9	7.6	8.9
1.25	5.3	6.2	7.5	5.3	6.1	7.3
2	3.1	3.9	5.0	3.4	4.1	5.2
5	1.9	2.4	3.4	2.4	3.0	3.9
10	1.5	1.9	2.8	2.0	2.6	3.5
20	1.2	1.6	2.3	1.8	2.3	3.2
50	1.0	1.3	1.9	1.6	2.1	2.9

DURATION OF DAILY FLOW							
Period	Percentage of time discharge equaled or exceeded						
	10	25	50	70	75	90	95
	DISCHARGE, IN FT^3/S						
1938-75	18	14	9	6.5	5.9	4.2	3.3
1939-60	18	13	9.3	6.7	6.2	4.7	4.0

*Station 01310000

*Table 11.--Streamflow characteristics, East Meadow Brook at Freeport**

LOW-FLOW FREQUENCY						
Average discharge during selected consecutive-day intervals (in cubic feet per second)						
Recurrence interval (years)	1939-1975			1939-1959		
	1-day	7-day	30-day	1-day	7-day	30-day
1.1	13.6	15	15.8	11.7	12.3	13.5
1.25	11.4	12.5	13.4	10.5	10.9	12.1
2.0	6.1	6.3	7.5	8.3	8.7	9.9
5.0	1.9	1.8	2.7	6.5	7.0	8.2
10	.8	.7	1.3	5.7	6.2	7.5
20	.4	.3	.6	5.1	5.6	6.9
50	.1	.1	.3	4.5	5.0	6.4

DURATION OF DAILY FLOW							
Period	Percentage of time discharge equaled or exceeded						
	10	25	50	70	75	90	95
	DISCHARGE, FT^3/S						
1939-75	26	19	14	9.8	8.7	3.4	1.7
1939-60	27	20	16	13	12	9.9	8.5

*Station 01310500

*Table 12.--Streamflow characteristics, Pines Brook at Malverne**

LOW-FLOW FREQUENCY						
Average discharge during selected consecutive-day intervals (in cubic feet per second)						
Recurrence interval (years)	1939-1975			1939-1960		
	1-day	7-day	30-day	1-day	7-day	30-day
1.1	4.4	4.6	5.1	4.6	4.7	5.4
1.25	2.3	2.7	3.3	2.7	3.2	3.8
2	.2	1.4	2.4	1.4	1.9	2.6
5	0	0	0	.2	.6	2.2
10	0	0	0	.1	.5	.9
20	0	0	0	.1	.3	.9
50	--	--	--	--	--	--

DURATION OF DAILY FLOW							
Period	Percentage of time discharge equaled or exceeded						
	10	25	50	70	75	90	95
	DISCHARGE, IN FT^3/S						
1938-75	8.4	5.9	3.6	1.4	0.7	.03	0
1938-60	9.1	6.9	4.9	3.8	3.6	2.6	1.9
1938-52	9.5	7.3	5.4	4.3	4	3	2.4
1954-75	6.8	4.1	1.6	.3	.2	0	0

*Station 01311000

Table 13.--Start of flow of selected streams, Long Island, New York

Stream name, station location, and station number	Date of observation	Distance upstream from gage (feet)	Flow duration at Nissequogue River near Smithtown, station 01804000 (percent)	Remarks
Massapequa Creek at Massapequa 01309500	10/66	7,200	99	900 ft north of Southern State Parkway[1/]
	4/22/68	9,500	75	3,200 ft north of Southern State Parkway
	5/10/76	10,300	25	4,500 ft north of Southern State Parkway
Bellmore Creek at Bellmore 01310000	4/16/68	8,200	75	West tributary, 300 ft north of Southern State Parkway
	4/16/68	8,300	75	East tributary, 100 ft south of Jerusalem Road
	5/10/76	10,200	25	West tributary, 200 ft south of Jerusalem Road
	5/10/76	11,500	25	East tributary, 100 ft north of Stirrup Lane
East Meadow Brook at Freeport 01310500	10/66	7,200	99	900 ft north of Southern State Parkway
	4/22/68	9,500	75	3,200 ft north of Southern State Parkway
Pines Brook at Malverne 01311000	4/16/68	4,500	75	1,200 ft north of Southern State Parkway
	5/11/76	6,000	25	At Southern State Parkway

1/ Measured along streambed shown on U.S. Geological Survey 7.5-minute series maps.

Chemical Quality of Streamflow

Water-quality data on Long Island streams are kept at the U.S. Geological Survey office on Long Island and at Survey headquarters in Reston, Va., and data on water quality of streams from 1966 through 1976 are presented in Ragone, Katz, Lindner, and Flipse (1976). Table 14 gives the median and range of nitrate (as N) concentration of three major streams in Sewer District 3, and of Pines Brook in Sewer District 2. Because these streams during base flow are fed by ground water, the water-quality analyses reflect the general quality of ground water near those streams. The median nitrate (as N) and ammonium (as N) concentration (table 14) in the unsewered area, as represented by Massapequa and Bellmore Creeks, is 6.6 mg/L and 2.4 mg/L, respectively. East Meadow Brook, which drains water from both sewered and unsewered areas, has lower median nitrate (as N) and ammonium (as N) concentrations (3.6 mg/L and 0.9 mg/L). Pines Brook, which lies entirely within a sewered area, has the lowest median nitrate (as N) concentration (1.7 mg/L) and ammonium concentration (0.14 mg/L). Although median values reflect the beneficial effects of sewerage on ground-water quality, concentrations of individual samples may vary greatly around the median, as shown by the range of concentrations in table 14.

The low nitrate and ammonium concentrations in stream water in the sewered area may represent the interception of sewage by sewers.

Table 14.--Median, minimum, and maximum concentrations of nitrate (as N) and ammonium (as N) in streams, 1966-75

[All concentrations are in milligrams per liter]

Stream name and station number	Constituents	Concentrations			Number of samples
		Median	Minimum	Maximum	
Massapequa Creek at Massapequa 01309500	Nitrate	6.6	2.7	16	58
	Ammonium	2.4	0	4.0	51
Bellmore Creek at Bellmore 01309950	Nitrate	6.6	.09	10	26
	Ammonium	2.4	.08	3.1	17
East Meadow Brook at Freeport 01310500	Nitrate	3.6	1.6	11	54
	Ammonium	.9	0	3.7	51
Pines Brook at Malverne 01311000	Nitrate	1.7	.4	4.1	18
	Ammonium	.14	0	1.3	13

Analyses by U.S. Geological Survey

MONITORING FUTURE HYDROLOGIC CHANGES THAT RESULT FROM URBANIZATION AND SEWERAGE

In Nassau and Suffolk Counties, ground water is the sole source of water supply. However, it is important to recognize that ground water is not an insolated, uniform resource; precipitation and surface water are an integral part of the island's hydrologic system, and water quality may be altered locally. The introduction of sewerage will change many features of the local hydrologic regime, including the chemical quality of ground water. Monitoring, as described below, would document the changes.

All stream gages on Long Island are maintained by the U.S. Geological Survey, and flows are continuously recorded at selected sites. Stream statistics used in this study are available at the Long Island office of the U.S. Geological Survey and at the Survey headquarters in Reston, Va. Streams unaffected by urbanization, such as Nissequogue River, could be used for comparison with streamflow statistics in Sewer District 3 in the future, and the number and frequency of surface-water samples collected could be increased. Start-of-flow surveys of streams in Sewer District 3, done regularly and according to established flow-duration points, would document effects of sewerage. The precipitation network described earlier would accurately assess the amount of water contributed to the hydrologic system.

In earlier studies of the effects of sewerage and urbanization on groundwater levels, the observation-well line designated "U" by Nassau County Department of Public Works, Division of Sanitation and Water Supply, and located near the Nassau-Suffolk County border (fig. 9), was used as a "reference line" (Franke, 1968, and Garber and Sulam, 1976). Because this area will be sewered in the near future, the U.S. Geological Survey, in conjunction with Suffolk County, has established a new reference line A-A' (fig. 1) in a rural area. This line consists of seven wells, designated S46914, S47226, S45227, S48946, S51583, S51592 by the New York State Department of Environmental Conservation. Water level and quality of water at this well line could be monitored on a continuing basis.

The importance of observation wells will increase with the growing demand for ground water. The value of observation-well records in determining hydrologic changes is exemplified in studies by Cohen and others (1969), in which the effects of the 1962-66 drought on Long Island's hydrologic system were analyzed, and in studies by Franke (1968) and Garber and Sulam (1976) on ground-water-level declines due to sewerage and ground-water pumpage.

The present observation-well network is adequate to monitor regional hydrologic conditions and will undoubtedly be maintained. Water-quality observations will probably also become a regular part of the monitoring program because of increased concern over water quality. Such observation wells would need to be constructed to allow adequate sampling and would require well casings large enough to accommodate submersible pumps when water levels fall below suction levels during pumping. Ideally, the lower water levels caused by sewerage and drought would be considered in determining adequate depths of observation wells.

After sewerage in Sewer District 3 has been completed, regional pollution of ground water by seepage of effluents from cesspool and septic tanks will most likely be reduced. However, with increased urbanization and industrialization, the potential of spills and seepage from leaching pits and underground liquid storage tanks will become greater. Also, leakage from sewer lines may be significant. Thus, for monitoring systems to be adequate, they should allow for installation of large numbers of wells locally to determine the extent of such leakage or spills and the direction of contaminant movement.

New York City's infiltration galleries would serve as an excellent ground-water monitoring system. The galleries, which extend from Wantagh to Massapequa, intercept shallow ground water flowing from the area northward. The samples collected would represent integrated water-quality characteristics of the area. In addition, the extensive historical water-quality records of these galleries (since 1910) can be used to determine regional changes in water quality with time and the effects of sewerage.

SUMMARY AND CONCLUSIONS

The hydrologic conditions and information on water quality discussed in this report portray conditions in Sewer District 3, in southeast Nassau County, before sewer installation. These data furnish a basis for future assessment of the effects of sewerage on the hydrology and water quality of the area.

The water-table aquifer and Magothy aquifer, which consist of moderately to highly permeable sand and gravel deposits, are the major water-bearing units in Sewer District 3. The water-table aquifer has an average horizontal hydraulic conductivity of 254 ft/day and excellent hydraulic connection with the island's streams. The Magothy aquifer has an average horizontal hydraulic conductivity of 56 ft/day and is in good hydraulic connection in most places with the overlying water-table aquifer. The Magothy aquifer is the major source of public water supply.

Population in Nassau County increased from approximately 55,000 in 1900 to over 1,400,000 in 1975. In parts of the study area, the nitrate yield from the increased number of cesspools and septic tanks doubled between 1950 and 1975. In addition to cesspools and septic tanks, lawn fertilizers contribute nitrate to ground water.

Precipitation is the sole source of fresh water to Long Island's hydrologic system. The long-term average annual precipitation in the study area is 40.93 in. and ranges from 24.50 in. to 51.58 in.

Water-level records from a network of widely distributed observation wells indicate that during the 1962-66 regional drought, the water table dropped to a record low. After 1967, water levels began to recover and, by 1975, were virtually at predrought levels.

Electric-analog model studies predict that planned sewerage in Sewer District 3 will produce water-level declines similar in magnitude to those following sewerage in adjacent Sewer District 2 and that the maximum decline (16 ft) will be near the present ground-water divide.

The quality of ground water in Sewer District 3 has been altered, first by fertilizers used in farming, and later by cesspool- and septic-tank effluent and lawn fertilizers. In the central part of District 3, nitrate (as N) concentrations greater than 10 mg/L are common in the water-table aquifer. The relatively high amount of ammonium in shallow ground water indicates little or no oxidation of cesspool effluent. Oxidation occurs as water moves through the unsaturated part of the aquifer; thus, where depth to water is shallow, ammonium is an expected product of cesspool or septic-tank load. In the southern part of Sewer District 2 (sewered area), median ammonium (as N) concentration was approximately 0.1 mg/L, whereas in the southern part of Sewer District 3 (unsewered area), the median concentration was 1.8 mg/L. The lower concentrations in the sewered area result from the interception of sewage by sewer lines. Median dissolved-oxygen concentrations in shallow ground water were higher in Sewer District 2 (4.3 mg/L) than in Sewer District 3 (2.4 mg/L), which reflects the interception of oxygen-consuming sewage by sewers in Sewer District 2.

The infiltration galleries of the Ridgewood Water-Supply System provide a regional water-quality-monitoring system for the water-table aquifer. Data collected at the galleries from 1910-75 show considerable deterioration in water quality during the last 50 years. Continued sampling of this system will provide data for detecting regional changes in water quality.

Pumpage of public-supply wells in the Magothy aquifer in Nassau County increased fivefold between 1950 and 1975. Within Sewer District 3, pumpage increased from 10 Mgal/d in 1950 to 53 Mgal/d in 1975. With the installation of sewers, approximately 85 percent of the pumped water will be routed to sewer lines; the rest will be used for lawn sprinkling and consumptive uses.

The maximum downward movement of nitrate and other constituents of the Magothy aquifer is in a zone in the area of Westbury, Hicksville, and Plainview, near the ground-water divide. About 24 percent of public-supply wells in Nassau County showed increasing nitrate trends in 1969.

Effluent from cesspool discharges is the primary source of nitrate in Nassau County's water supply. The lowest concentration of nitrate, chloride, and total solids in the Magothy aquifer water are south of a line running from North Merrick to South Farmingdale.

The streams of Long Island under presuburban conditions derived 95 percent of their water from ground-water discharge. Because sewerage is expected to lower the water table, streamflow will decline. Electric-analog-model simulation of the effects of sewerage in Sewer District 3 showed an overall reduction of 40 percent in streamflow. Sewerage will also affect the low-flow characteristics of streams. During base flow, the median nitrate and ammonium concentration of streamflow is currently lower in Sewer District 2 than in Sewer District 3.

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APPENDICES

APPENDIX 1

More than 90 percent of the samples were collected during 1974-77. Location of wells is shown in figure 13 (p. 26). Water-quality values that exceed the drinking-water-standard limits are marked by an asterisk. Date of sample collected is given in year, month, and day.

LIST OF ABBREVIATIONS USED IN APPENDIX 1

MG/L	milligrams per liter
UG/L	micrograms per liter
ALK, TOT	alkalinity, total
DISS	dissolved
MEAS	measured
NONCARB	noncarbonate
NITR	nitrogen
ORG	organic
TOTKJD	total kjeldahl
PHOS ORTHO	phosphate, ortho
DIS CALC SUM	dissolved calculated sum
SP. CONDUCTANCE FLD	specific conductance (field), in µmho/cm at 25°C
<	less than
*	exceeds drinking-water standards

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77

Constituent		Local well numbers and date (yr, mo, day)									
		N 1160	N 1160	N 1160	N 1160	N 1160	N 1160	N 1160	N 1160	N 1160	N 1160
		75 7 18	75 9 9	751112	751211	76 116	76 210	76 311	76 4 8	76 510	76 6 7
ALK, TOT (AS CACO3)	MG/L	16.00	14.00	16.00	16.00	16.00	15.00	15.00	16.00	18.00	17.00
BICARBONATE	MG/L	19.00	17.00	20.00	20.00	20.00	18.00	18.00	20.00	22.00	21.00
CALCIUM DISS	MG/L	9.80	4.00	6.50	5.30	3.20	3.50	3.50	3.40	5.10	5.30
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	14.00	6.90	19.00	8.40	7.30	8.30	10.00	11.00	12.00	11.00
DETERGENTS (MBAS)	MG/L	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00
FLUORIDE DISS	MG/L	0.00	0.10	0.10	0.00	0.10	0.10	0.20	0.00	0.00	0.00
HARDNESS NONCARB	MG/L	20.00	0.00	3.00	2.00	0.00	0.00	0.00	0.00	1.00	2.00
HARDNESS TOTAL	MG/L	36.00	12.00	20.00	19.00	12.00	12.00	14.00	13.00	19.00	19.00
IRON DISSOLVED	UG/L			130.00	250.00	270.00	330.00	320.00	360.00	330.00	290.00
IRON TOTAL	UG/L	300.00*	910.00*	570.00*	1400.00*	470.00*	540.00*	520.00*	750.00*	1300.00*	710.00*
MAGNESIUM DISS	MG/L	2.70	0.50	0.80	1.30	1.00	0.80	1.20	1.10	1.50	1.50
MANGANESE TOTAL	UG/L	200.00*	80.00*	70.00*	50.00*	50.00*	50.00*	60.00*	60.00*	60.00*	30.00*
NITR. NO2 AS N TOTAL	MG/L		0.00	0.10	0.01	0.01	0.02	0.01	0.01	0.01	0.01
NITR. NO3 AS N TOTAL	MG/L		3.20	1.10	1.20	1.20	1.30	1.60	1.80	1.60	1.70
NITROGEN NH4 ASN TOT	MG/L	0.00	0.02	0.01	0.01	0.03	0.04	0.02	0.02	0.00	0.01
NITROGEN NO2 ASN DIS	MG/L	< 0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01
NITROGEN NO3 ASN DIS	MG/L	2.30	1.70	1.60	1.20	1.30	1.30	1.60	2.20	2.60	1.60
NITROGEN TOT AS N	MG/L		3.30	1.20	1.30	1.20	1.40	1.60	1.90	1.60	1.80
NITROGEN TOT ORG N	MG/L	0.42	0.05	0.13	0.06	0.00	0.02	0.01	0.08	0.00	0.09
NITROGEN TOTKJD AS N	MG/L	0.42	0.07	0.14	0.07	0.01	0.06	0.03	0.10	0.00	0.10
NO2 + NO3 AS N TOT	MG/L		3.20	1.10	1.20	1.20	1.30	1.60	1.80	0.16	1.70
NO2+NO3 AS N DISS	MG/L		1.70	1.60	1.20	0.13	1.30	1.60	2.20	2.60	1.60
OXYGEN DISSOLVED	MG/L	1.40		1.40	2.10		1.10	2.40		0.60	
PH FIELD		6.20	6.00	0.60	6.10	5.90	6.10	6.70	6.80	6.10	6.10
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L		0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.00
PHOSPHORUS TOT AS P	MG/L	0.18	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01
POTASSIUM DISS	MG/L	1.10	1.00	1.20	1.00	0.90	0.80	0.90	0.90	0.90	1.00
RESIDUE DIS CALC SUM	MG/L	84.00	63.00	74.00	60.00	53.00	55.00	62.00	66.00	72.00	68.00
SILICA DISSOLVED	MG/L	5.10	4.80	4.60	4.70	4.50	4.60	4.90	4.70	4.80	4.90
SODIUM DISS	MG/L	15.00	15.00	15.00	13.00	12.00	12.00	14.00	15.00	14.00	14.00
SP. CONDUCTANCE FLD		190.00	119.00	145.00	120.00	95.00	65.00	80.00	99.00	80.00	90.00
SULFATE DISS	MG/L	27.00	15.00	10.00	11.00	8.40	10.00	11.00	10.00	11.00	13.00
WATER TEMP (DEG C)		15.50	15.00	15.00	14.00	14.00	10.50	15.00	11.00	15.00	14.00
DEPTH TO WATER	FT	31.40		31.00	30.56	29.80	28.75	23.40	28.85	29.88	29.44

CONSTITUENT		N 1160	N 1160	N 1160	N 1164	N 1164	N 1164	N 1164	N 1164	N 1164	N 1164
		76 715	76 8 2	76 9 1	701210	7412 2	75 328	75 711	75 8 6	75 9 4	7510 6
ALK, TOT (AS CACO3)	MG/L	16.00	17.00	16.00	15.00		16.00	14.00	12.00	14.00	14.00
BICARBONATE	MG/L	19.00	21.00	20.00	18.00		20.00	17.00	15.00	17.00	17.00
CALCIUM DISS	MG/L	6.50	8.40	8.80			26.00	27.00	39.00	24.00	28.00
CARBONATE	MG/L	0.00	0.00	0.00			0.00	0.00	0.00		0.00
CHLORIDE DISS	MG/L	16.00	16.00	16.00	32.00		28.00	24.00	71.00	45.00	59.00
DETERGENTS (MBAS)	MG/L	0.00	0.00	0.00	0.10	0.09	0.07	0.06	0.10	0.10	0.10
FLUORIDE DISS	MG/L	0.00	0.10	0.00			0.10	0.00	0.00	0.10	0.00
HARDNESS NONCARB	MG/L	10.00	12.00	14.00	81.00		62.00	68.00	100.00	59.00	72.00
HARDNESS TOTAL	MG/L	26.00	29.00	30.00	96.00		78.00	82.00	120.00	73.00	86.00
IRON DISSOLVED	UG/L	330.00	280.00	480.00							
IRON TOTAL	UG/L	700.00*	390.00*	760.00*			3700.00*	80.00*	40.00*	120.00*	120.00*
MAGNESIUM DISS	MG/L	2.30	2.00	2.00			3.20	3.60	4.80	3.20	3.90
MANGANESE TOTAL	UG/L	50.00*	40.00*	20.00*			30.00*	0.00	0.00	10.00*	20.00*
NITR. NO2 AS N TOTAL	MG/L	0.01	0.01	0.01					0.01	0.00	0.00
NITR. NO3 AS N TOTAL	MG/L	1.30	0.92	1.20					6.30	6.20	5.80
NITROGEN NH4 ASN TOT	MG/L	0.01	0.01	0.03		0.00	0.00	0.00	0.01	0.01	0.01
NITROGEN NO2 ASN DIS	MG/L	0.01	0.01	0.01	0.00	0.01	< 0.01	< 0.01	0.01	0.00	0.00
NITROGEN NO3 ASN DIS	MG/L	1.40	1.30	0.91	7.00	5.50	5.10	6.80	6.20	6.00	5.30
NITROGEN TOT AS N	MG/L	1.40	1.00	1.30					6.40	6.30	5.90
NITROGEN TOT ORG N	MG/L	0.12	0.07	0.02		0.56	0.00	1.10	0.13	0.09	0.13
NITROGEN TOTKJD AS N	MG/L	0.13	0.08	0.05		0.56	0.00	1.10	0.14	0.10	0.14
NO2 + NO3 AS N TOT	MG/L	1.30	0.93	1.20					6.30		5.80
NO2+NO3 AS N DISS	MG/L	1.40	1.30	0.92					6.20		5.30
OXYGEN DISSOLVED	MG/L	1.90		1.90			3.50	3.90	2.70		1.40
PH FIELD		6.00	6.00	6.30	6.30		6.08	5.75	5.80	5.60	5.50
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.00	0.01	0.01					0.01		0.00
PHOSPHORUS TOT AS P	MG/L	0.01	0.01	0.01		0.00	0.23	0.25	0.01	0.01	0.01
POTASSIUM DISS	MG/L	1.40	1.00	1.10			4.20	4.10	4.90	4.60	4.90
RESIDUE DIS CALC SUM	MG/L	76.00	73.00	72.00			148.00	141.00	233.00	200.00	205.00
SILICA DISSOLVED	MG/L	5.00	5.00	5.00			8.40	8.30	8.20	7.90	7.60
SODIUM DISS	MG/L	14.00	12.00	12.00			17.00	17.00	28.00	32.00	26.00
SP. CONDUCTANCE FLD		144.00	120.00	148.00	320.00		265.00	295.00	465.00	348.00	390.00
SULFATE DISS	MG/L	15.00	12.00	13.00	40.00		51.00	49.00	43.00	48.00	44.00
WATER TEMP (DEG C)		14.50	13.00	14.50			14.00	16.00	14.00	19.00	14.50
DEPTH TO WATER	FT	30.52	30.80	29.93		19.82		19.60	18.00	19.70	

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 1164	N 1164	N 1164	N 1164	N 1164	N 1164	N 1164	N 1164	N 1164	N 1164
		7511 3	7512 1	76 113	76 2 4	76 3 1	76 4 5	76 5 3	76 6 1	76 715	76 8 3
ALK, TOT (AS CACO3)	MG/L	16.00	16.00	16.00	15.00	15.00	15.00	15.00	18.00	31.00	15.00
BICARBONATE	MG/L	19.00	19.00	20.00	18.00	18.00	18.00	18.00	22.00	38.00	18.00
CALCIUM DISS	MG/L	26.00	30.00	27.00	28.00	29.00	28.00	27.00	30.00	26.00	23.00
CARBONATE	MG/L	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	35.00	34.00	31.00	32.00	35.00	33.00	32.00	45.00	29.00	56.00
DETERGENTS (MBAS)	MG/L	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.20	0.10	0.10
FLUORIDE DISS	MG/L	0.10	0.00	0.10	0.10	0.10	0.00	0.00	0.00	0.10	0.00
HARDNESS NONCARB	MG/L	62.00	75.00	66.00	70.00	73.00	70.00	67.00	74.00	48.00	54.00
HARDNESS TOTAL	MG/L	78.00	91.00	83.00	85.00	88.00	85.00	82.00	92.00	79.00	69.00
IRON DISSOLVED	UG/L	100.00	60.00	90.00	70.00	30.00	50.00	60.00	60.00	450.00	90.00
IRON TOTAL	UG/L	250.00*	140.00*	170.00*	110.00*	100.00*	130.00*	300.00*	90.00*	700.00*	140.00*
MAGNESIUM DISS	MG/L	3.10	3.80	3.70	3.70	3.80	3.60	3.50	4.20	3.40	2.80
MANGANESE TOTAL	UG/L	20.00*	0.00	0.00	0.00	0.00	10.00*	10.00*	0.00	10.00*	0.00
NITR. NO2 AS N TOTAL	MG/L	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01
NITR. NO3 AS N TOTAL	MG/L	5.60	5.70	6.40	6.90	6.30	6.70	6.80	6.40	6.60	6.90
NITROGEN NH4 ASN TOT	MG/L	0.01	0.01	0.02	0.00	0.00	0.00	0.04	0.02	0.01	0.01
NITROGEN NO2 ASN DIS	MG/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01
NITROGEN NO3 ASN DIS	MG/L	5.90	5.70	6.40	2.50	3.20	6.20	6.80	6.10	6.20	7.00
NITROGEN TOT AS N	MG/L	5.60	5.80	6.50	7.00	6.50	6.80	7.00	6.60	12.00	7.00
NITROGEN TOT ORG N	MG/L	0.03	0.10	0.09	0.07	0.24	0.08	0.11	0.13	5.70	0.12
NITROGEN TOTKJD AS N	MG/L	0.04	0.11	0.11	0.07	0.24	0.08	0.15	0.15	5.70	0.13
NO2 + NO3 AS N TOT	MG/L	5.60	5.70	6.40	6.90	6.30	6.70	6.80	6.40	6.60	6.90
NO2+NO3 AS N DISS	MG/L	5.90	5.70	6.40	2.50	3.20	6.20	6.80	6.10	6.20	7.00
OXYGEN DISSOLVED	MG/L	4.30	5.70	4.30	3.60	3.70	3.60	4.20	1.60	2.30	3.00
PH FIELD		5.70	6.00	5.50		5.80	5.50	5.60	5.60	5.90	5.60
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01
PHOSPHORUS TOT AS P	MG/L	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01
POTASSIUM DISS	MG/L	4.50	3.80	4.10	3.90	4.00	4.30	4.30	4.80	4.30	4.90
RESIDUE DIS CALC SUM	MG/L	184.00	180.00	175.00	162.00	169.00	178.00	179.00	202.00	200.00	211.00
SILICA DISSOLVED	MG/L	7.60	7.70	7.70	8.10	8.10	8.20	8.10	8.50	8.10	7.50
SODIUM DISS	MG/L	24.00	19.00	18.00	17.00	19.00	19.00	20.00	23.00	26.00	38.00
SP. CONDUCTANCE FLD		305.00	298.00	330.00	280.00	295.00	310.00	95.00	315.00	330.00	360.00
SULFATE DISS	MG/L	48.00	47.00	45.00	49.00	47.00	46.00	45.00	49.00	56.00	39.00
WATER TEMP (DEG C)		14.00	13.00	13.50	13.00	15.00	12.80	17.00	13.00	15.00	14.00
DEPTH TO WATER	FT	19.50	19.45	18.90	18.30	18.00	18.24	18.74	19.19	20.71	20.86

CONSTITUENT		N 1164	N 1165	N 1165	N 1165	N 1165	N 1165	N 1165	N 1165	N 1165	N 1165
		76 830	66 6 3	68 711	75 711	75 8 6	75 9 4	7510 7	7511 3	7512 2	76 113
ALK, TOT (AS CACO3)	MG/L	14.00	64.00	35.00	14.00	15.00	16.00	16.00	19.00	17.00	16.00
BICARBONATE	MG/L	17.00	78.00	43.00	17.00	18.00	20.00	20.00	23.00	21.00	20.00
CALCIUM DISS	MG/L	15.00	33.00	36.00	31.00	30.00	32.00	30.00	29.00	33.00	28.00
CARBONATE	MG/L	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	33.00	22.00	33.00	55.00	44.00	46.00	44.00	39.00	39.00	36.00
DETERGENTS (MBAS)	MG/L	0.10	0.10	0.38	0.10	0.10	0.10	0.00	0.20	0.10	0.10
FLUORIDE DISS	MG/L	0.10	0.10	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.10
HARDNESS NONCARB	MG/L	33.00	51.00	76.00	82.00	77.00	84.00	76.00	72.00	83.00	72.00
HARDNESS TOTAL	MG/L	47.00	115.00	112.00	96.00	92.00	100.00	92.00	91.00	100.00	88.00
IRON DISSOLVED	UG/L	80.00							220.00	80.00	60.00
IRON TOTAL	UG/L	140.00*			130.00*	100.00*	220.00*	130.00*	510.00*	160.00*	130.00*
MAGNESIUM DISS	MG/L	2.20	7.90	5.20	4.60	4.20	4.90	4.20	4.50	4.30	4.50
MANGANESE TOTAL	UG/L	0.00			2100.00*	40.00*	40.00*	50.00*	70.00*	30.00*	30.00*
NITR. NO2 AS N TOTAL	MG/L	0.01			0.01	0.01	0.00	0.01	0.01	0.01	0.01
NITR. NO3 AS N TOTAL	MG/L	7.50			8.20	7.70	10.00	3.70	7.70	8.70	8.30
NITROGEN NH4 ASN TOT	MG/L	0.01			0.00	0.01	0.00	0.03	0.01	0.01	0.03
NITROGEN NO2 ASN DIS	MG/L	0.01	0.01		0.00	0.04	0.00	0.00	0.01	0.02	0.01
NITROGEN NO3 ASN DIS	MG/L	7.50	3.80	11.00	8.40	7.60	10.00	8.40	8.10	6.60	8.30
NITROGEN TOT AS N	MG/L	7.60			8.30	7.80	10.00	3.90	7.80	8.80	8.40
NITROGEN TOT ORG N	MG/L	0.12			0.11	0.06	0.09	0.19	0.06	0.10	0.03
NITROGEN TOTKJD AS N	MG/L	0.13			0.11	0.07	0.09	0.22	0.07	0.11	0.06
NO2 + NO3 AS N TOT	MG/L	7.50			8.20	7.70	10.00*	3.70	7.70	8.70	8.30
NO2+NO3 AS N DISS	MG/L	7.50			8.40	7.60	10.00	8.40	8.10	6.60	8.30
OXYGEN DISSOLVED	MG/L	4.00			1.40	3.10	4.40	3.70	1.80	2.90	3.60
PH FIELD		5.60	6.60	6.30	5.60	5.65	5.50	5.60	5.50	6.00	5.70
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.02			0.01	0.01	0.01	0.00	0.01	0.00	0.01
PHOSPHORUS TOT AS P	MG/L	0.12			0.01	0.01	0.01	0.01	0.01	0.01	0.02
POTASSIUM DISS	MG/L	4.10	3.70	6.80	5.30	4.70	4.70	5.20	5.00	4.70	4.80
RESIDUE DIS CALC SUM	MG/L	171.00	173.00	248.00	266.00	220.00	237.00	224.00	218.00	215.00	213.00
SILICA DISSOLVED	MG/L	7.30	6.60	9.80	13.00	12.00	12.00	11.00	12.00	13.00	13.00
SODIUM DISS	MG/L	30.00	14.00	25.00	33.00	29.00	30.00	27.00	26.00	24.00	24.00
SP. CONDUCTANCE FLD		275.00	303.00	414.00	418.00	390.00	415.00	390.00	370.00	375.00	394.00
SULFATE DISS	MG/L	38.00	30.00	61.00	79.00	54.00	53.00	56.00	55.00	57.00	56.00
WATER TEMP (DEG C)		13.00	14.00	14.00	17.00	13.50	19.00	15.00	15.00	15.00	15.00
DEPTH TO WATER	FT	19.82				17.60	18.25	18.00	17.85	18.10	17.60

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 1165	N 1165	N 1165	N 1165	N 1165	N 1165	N 1165	N 1165	N 1167	N 1167
		76 2 4	76 3 1	76 4 5	76 5 3	76 6 1	76 715	76 8 3	76 830	75 711	75 8 6
ALK, TOT (AS CACO3)	MG/L	16.00	15.00	14.00	13.00	16.00	23.00	16.00	15.00	16.00	16.00
BICARBONATE	MG/L	19.00	18.00	17.00	16.00	19.00	28.00	20.00	18.00	20.00	19.00
CALCIUM DISS	MG/L	27.00	28.00	29.00	29.00	29.00	27.00	28.00	26.00	28.00	31.00
CARBONATE	MG/L		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	36.00	34.00	35.00	33.00	32.00	27.00	26.00	24.00	19.00	14.00
DETERGENTS (MBAS)	MG/L	0.10	0.10	0.10	0.10	0.20	0.10	0.10	0.10		0.10
FLUORIDE DISS	MG/L	0.10	0.10	0.00	0.00	0.10	0.10	0.00	0.10	0.00	0.00
HARDNESS NONCARB	MG/L	69.00	74.00	76.00	78.00	73.00	60.00	69.00	68.00	74.00	81.00
HARDNESS TOTAL	MG/L	85.00	88.00	90.00	91.00	89.00	83.00	86.00	83.00	90.00	96.00
IRON DISSOLVED	UG/L	100.00	50.00	80.00	210.00	60.00	310.00	90.00	120.00		
IRON TOTAL	UG/L	160.00*	130.00*	130.00*	1200.00*	80.00*	550.00*	110.00*	150.00*	80.00*	60.00*
MAGNESIUM DISS	MG/L	4.20	4.50	4.20	4.50	4.00	3.80	3.80	4.30	4.90	4.60
MANGANESE TOTAL	UG/L	50.00*	20.00*	40.00*	50.00*	20.00*	50.00*	20.00*	20.00*	0.00	0.00
NITR. NO2 AS N TOTAL	MG/L	0.02	0.01	0.00	0.01	0.01	0.01	0.01	0.01		0.00
NITR. NO3 AS N TOTAL	MG/L	9.30	8.20	0.27	9.00	7.90	7.00	6.50	6.50		4.40
NITROGEN NH4 ASN TOT	MG/L	0.00	0.00	0.00	0.03	0.01	0.01	0.01	0.01		0.01
NITROGEN NO2 ASN DIS	MG/L	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01		0.04
NITROGEN NO3 ASN DIS	MG/L	8.20	4.00	0.11	8.50	7.90	6.50	6.50	5.90		4.40
NITROGEN TOT AS N	MG/L	9.40	8.40	0.55	9.20	8.00	7.20	6.50	6.50		4.50
NITROGEN TOT ORG N	MG/L	0.11	0.18	0.28	0.15	0.12	0.14	0.00	0.00		0.06
NITROGEN TOTKJD AS N	MG/L	0.11	0.18	0.28	0.18	0.13	0.15	0.00	0.00		0.07
NO2 + NO3 AS N TOT	MG/L	9.30	8.20	0.27	9.00	7.90	7.00	6.50	6.50		4.40
NO2+NO3 AS N DISS	MG/L	8.20	4.00	0.12	8.50	7.90	6.50	6.50	5.90		4.40
OXYGEN DISSOLVED	MG/L	3.20	2.20	2.20	3.50	1.90	1.80	1.80	2.10	5.80	5.40
PH FIELD			5.73	5.50	5.70	5.50	6.00	5.60	5.50	5.80	5.40
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01		0.01
PHOSPHORUS TOT AS P	MG/L	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.04		0.01
POTASSIUM DISS	MG/L	4.90	4.70	4.90	4.70	4.90	4.30	4.20	4.00	1.90	1.90
RESIDUE DIS CALC SUM	MG/L	212.00	191.00	175.00	208.00	208.00	201.00	193.00	187.00	129.00	147.00
SILICA DISSOLVED	MG/L	13.00	13.00	13.00	12.00	13.00	13.00	13.00	13.00	6.90	7.10
SODIUM DISS	MG/L	24.00	24.00	24.00	24.00	24.00	24.00	21.00	19.00	7.70	7.90
SP. CONDUCTANCE FLD		310.00	320.00	330.00	320.00	300.00	315.00	305.00	285.00	255.00	253.00
SULFATE DISS	MG/L	57.00	56.00	56.00	55.00	57.00	59.00	58.00	61.00	51.00	52.00
WATER TEMP (DEG C)		13.00	13.00	14.00	17.00	12.00	13.00	14.50	13.50	16.00	15.00
DEPTH TO WATER	FT	16.90	16.70	16.86	17.46	17.90	19.49	19.60	18.92	14.20	14.00

CONSTITUENT		N 1167 75 9 5	N 1167 7510 7	N 1167 7511 3	N 1167 7512 2	N 1167 76 113	N 1167 76 2 4	N 1167 76 3 1	N 1167 76 4 5	N 1167 76 5 3	N 1167 76 6 1
ALK, TOT (AS CACO3)	MG/L	32.00	17.00	16.00	16.00	14.00	11.00	11.00	11.00	16.00	19.00
BICARBONATE	MG/L	39.00	21.00	20.00	20.00	17.00	14.00	14.00	14.00	19.00	23.00
CALCIUM DISS	MG/L	35.00	34.00	28.00	29.00	21.00	20.00	22.00	24.00	22.00	32.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	29.00	34.00	17.00	24.00	11.00	10.00	15.00	21.00	22.00	34.00
DETERGENTS (MBAS)	MG/L	0.00	0.00	0.10	0.00	0.00	0.00	0.10	0.10	0.10	0.20
FLUORIDE DISS	MG/L	0.10	0.00	0.00	0.00	0.00	0.20	0.10	0.00	0.00	0.00
HARDNESS NONCARB	MG/L	80.00	89.00	70.00	72.00	51.00	52.00	53.00	62.00	52.00	76.00
HARDNESS TOTAL	MG/L	110.00	110.00	86.00	89.00	65.00	63.00	64.00	74.00	68.00	95.00
IRON DISSOLVED	UG/L			270.00	240.00	150.00	110.00	90.00	100.00	190.00	150.00
IRON TOTAL	UG/L	120.00*	240.00*	450.00*	360.00*	200.00*	180.00*	150.00*	140.00*	250.00*	150.00*
MAGNESIUM DISS	MG/L	6.00	5.10	4.00	4.00	3.10	3.20	2.30	3.30	3.10	3.70
MANGANESE TOTAL	UG/L	100.00*	1500.00*	790.00*	1200.00*	270.00*	190.00*	190.00*	150.00*	20.00*	320.00*
NITR. NO2 AS N TOTAL	MG/L	0.01	0.01	0.01	0.02	0.01	0.01	0.00	0.00	0.01	0.02
NITR. NO3 AS N TOTAL	MG/L	3.50	3.40	3.00	2.60	2.90	3.00	3.60	3.60	3.30	3.10
NITROGEN NH4 ASN TOT	MG/L	0.00	0.00	0.01	0.02	0.01	0.00	0.00	0.01	0.04	0.01
NITROGEN NO2 ASN DIS	MG/L	0.01	0.01	0.01	0.03	0.01	0.02	0.01	0.00	0.01	0.02
NITROGEN NO3 ASN DIS	MG/L	3.50	3.50	2.80	2.50	2.00	2.60	2.40	3.30	3.40	2.70
NITROGEN TOT AS N	MG/L	3.50	3.50	3.20	2.70	3.00	3.10	3.70	3.80	3.50	3.30
NITROGEN TOT ORG N	MG/L	0.04	0.11	0.15	0.05	0.11	0.06	0.10	0.14	0.11	0.17
NITROGEN TOTKJD AS N	MG/L	0.04	0.11	0.16	0.07	0.12	0.06	0.10	0.15	0.15	0.18
NO2 + NO3 AS N TOT	MG/L	3.50	3.40	3.00	2.60	2.90	3.00	3.60	3.60	3.30	3.10
NO2+NO3 AS N DISS	MG/L	3.50	3.50	2.80	2.50	2.00	2.60	2.40	3.30	3.40	2.70
OXYGEN DISSOLVED	MG/L	3.80	2.70	2.90	2.50	3.60	2.80	3.90	5.70	9.80	3.60
PH FIELD		5.60	5.30	5.50	6.00	5.80		5.80	5.70	6.00	5.70
PHENOLS	UG/L			0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00
PHOS ORTHO TOT AS P	MG/L	0.01	0.00	0.02	0.00	0.01	0.01	0.01	0.00	0.01	0.01
PHOSPHORUS TOT AS P	MG/L	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
POTASSIUM DISS	MG/L	2.00	2.00	1.80	1.60	1.50	1.40	1.60	1.60	1.60	1.70
RESIDUE DIS CALC SUM	MG/L	179.00	176.00	142.00	148.00	111.00	111.00	112.00	126.00	127.00	156.00
SILICA DISSOLVED	MG/L	7.40	6.60	6.70	6.60	6.50	6.50	6.30	6.50	6.40	7.00
SODIUM DISS	MG/L	9.10	10.00	8.60	8.40	6.90	7.00	7.80	8.90	11.00	11.00
SP. CONDUCTANCE FLD		310.00	330.00	275.00	285.00	217.00	155.00	195.00	210.00	200.00	250.00
SULFATE DISS	MG/L	56.00	58.00	53.00	53.00	44.00	44.00	39.00	39.00	36.00	43.00
WATER TEMP (DEG C)		16.00	16.00	16.00	15.50	15.00	13.00	13.00	13.00	17.50	14.00
DEPTH TO WATER	FT	14.60	14.50	14.70	14.60	14.20	13.50	13.90	13.90	14.57	14.49

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 1167	N 1167	N 1167	N 1168	N 1168	N 1168	N 1168	N 1168	N 1168	N 1168
		76 715	76 8 3	76 830	66 726	75 8 6	75 9 5	7510 7	7511 3	7512 2	76 113
ALK, TOT (AS CACO3)	MG/L	16.00	15.00	15.00	20.00	18.00	21.00	18.00	17.00	18.00	16.00
BICARBONATE	MG/L	20.00	18.00	18.00	24.00	22.00	25.00	22.00	21.00	22.00	20.00
CALCIUM DISS	MG/L	29.00	27.00	25.00		21.00	21.00	22.00	23.00	24.00	20.00
CARBONATE	MG/L	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	26.00	20.00	17.00	17.00	26.00	28.00	36.00	39.00	44.00	41.00
DETERGENTS (MBAS)	MG/L	0.10	0.10	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00
FLUORIDE DISS	MG/L	0.10	0.10	0.10		0.00	0.10	0.00	0.10	0.10	0.10
HARDNESS NONCARB	MG/L	74.00	66.00	63.00	46.00	50.00	49.00	54.00	53.00	60.00	51.00
HARDNESS TOTAL	MG/L	90.00	81.00	78.00	66.00	69.00	69.00	72.00	70.00	78.00	68.00
IRON DISSOLVED	UG/L	190.00	210.00	190.00					360.00	300.00	150.00
IRON TOTAL	UG/L	220.00*	240.00*	230.00*		350.00*	300.00*	230.00*	480.00*	1200.00*	360.00*
MAGNESIUM DISS	MG/L	4.30	3.20	3.80		3.90	4.10	4.10	3.00	4.40	4.30
MANGANESE TOTAL	UG/L	1700.00*	1400.00*	940.00*		0.00	10.00*	20.00*	20.00*	30.00*	10.00*
NITR. NO2 AS N TOTAL	MG/L	0.01	0.01	0.01		0.00	0.00	0.00	0.01	0.01	0.02
NITR. NO3 AS N TOTAL	MG/L	3.30	4.40	4.70		1.50	1.60	1.50	1.60	1.20	1.60
NITROGEN NH4 ASN TOT	MG/L	0.02	0.01	0.01		0.01	0.00	0.00	0.00	0.01	0.03
NITROGEN NO2 ASN DIS	MG/L	0.01	0.01	0.01	0.00	0.01	0.03	0.00	0.01	0.01	0.02
NITROGEN NO3 ASN DIS	MG/L	3.70	4.00	4.70	0.40	1.40	1.60	1.10	1.40	1.40	1.60
NITROGEN TOT AS N	MG/L	5.20	4.50	4.90		1.60	1.70	1.50	1.60	1.30	1.70
NITROGEN TOT ORG N	MG/L	1.90	0.07	0.14		0.04	0.06	0.02	0.01	0.06	0.02
NITROGEN TOTKJD AS N	MG/L	1.90	0.08	0.15		0.05	0.06	0.02	0.01	0.07	0.05
NO2 + NO3 AS N TOT	MG/L	3.30	4.40	4.70		1.50	1.60	1.50	1.60	1.20	1.60
NO2+NO3 AS N DISS	MG/L	3.70	4.00	4.70		1.40	1.60	1.10	1.40	1.40	1.60
OXYGEN DISSOLVED	MG/L	2.60	2.90	6.00		6.90	3.40	2.40	1.70	1.90	
PH FIELD		5.70	5.70	5.60	5.90	5.65	5.70	5.70	5.80	6.10	5.90
PHENOLS	UG/L	0.00	0.00	0.00							
PHOS ORTHO TOT AS P	MG/L	0.03	0.01	0.01		0.01	0.01	0.00	0.01	0.00	0.01
PHOSPHORUS TOT AS P	MG/L	0.02	0.02	0.01		0.01	0.01	0.01	0.01	0.01	0.03
POTASSIUM DISS	MG/L	1.90	1.70	1.60		3.30	3.40	3.80	4.00	3.60	3.70
RESIDUE DIS CALC SUM	MG/L	156.00	144.00	140.00		132.00	136.00	141.00	148.00	158.00	152.00
SILICA DISSOLVED	MG/L	6.60	6.50	6.40		9.10	9.10	7.70	9.20	9.40	9.10
SODIUM DISS	MG/L	11.00	9.40	8.80		15.00	14.00	14.00	16.00	17.00	20.00
SP. CONDUCTANCE FLD		270.00	242.00	230.00	220.00	250.00	240.00	275.00	305.00	297.00	300.00
SULFATE DISS	MG/L	51.00	49.00	47.00		37.00	37.00	38.00	37.00	38.00	37.00
WATER TEMP (DEG C)		15.00	14.50	15.00		17.00	15.00	15.00	15.50	14.00	10.50
DEPTH TO WATER	FT	15.56	15.35	14.95			9.58	9.30	9.60	9.30	8.90

CONSTITUENT		N 1168	N 1168	N 1168	N 1168	N 1168	N 1168	N 1168	N 1168	N 1176	N 1176
		76 2 4	76 3 1	76 4 5	76 5 3	76 6 1	76 715	76 8 3	76 830	71 616	751023
ALK, TOT (AS CACO3)	MG/L	23.00	18.00	16.00	20.00	20.00	17.00	18.00	17.00	7.00	11.00
BICARBONATE	MG/L	28.00	22.00	20.00	24.00	24.00	21.00	22.00	21.00	8.00	13.00
CALCIUM DISS	MG/L	18.00	20.00	18.00	19.00	22.00	20.00	21.00	21.00	2.50	3.50
CARBONATE	MG/L		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	39.00	37.00	31.00	27.00	28.00	26.00	26.00	26.00	7.00	7.90
DETERGENTS (MBAS)	MG/L	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.07	0.00
FLUORIDE DISS	MG/L	0.10	0.10	0.00	0.00	0.00	0.10	0.10	0.10	0.00	0.00
HARDNESS NONCARB	MG/L	38.00	48.00	44.00	42.00	51.00	52.00	51.00	54.00	4.00	0.00
HARDNESS TOTAL	MG/L	61.00	66.00	60.00	62.00	70.00	70.00	69.00	71.00	11.00	11.00
IRON DISSOLVED	UG/L	160.00	120.00	170.00	310.00	150.00	180.00	160.00	180.00	420.00	
IRON TOTAL	UG/L	340.00*	230.00*	240.00*	570.00*	160.00*	210.00*	200.00*	220.00*		*15000.*
MAGNESIUM DISS	MG/L	4.00	3.80	3.70	3.50	3.70	4.80	4.00	4.50	1.10	0.50
MANGANESE TOTAL	UG/L	10.00*	0.00	10.00*	0.00	0.00	0.00	0.00	10.00*		320.00*
NITR. NO2 AS N TOTAL	MG/L	0.02	0.00	0.00	0.01	0.01	0.01	0.01	0.01		0.00
NITR. NO3 AS N TOTAL	MG/L	1.60	1.60	1.70	1.70	1.70	1.80	1.80	1.80		1.60
NITROGEN NH4 ASN TOT	MG/L	0.00	0.00	0.00	0.02	0.01	0.01	0.01	0.01		0.00
NITROGEN NO2 ASN DIS	MG/L	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.01
NITROGEN NO3 ASN DIS	MG/L	1.30	0.87	1.40	1.70	1.70	1.70	1.70	1.80	2.10	1.50
NITROGEN TOT AS N	MG/L	1.60	1.80	1.90	1.90	1.90	2.10	1.80	2.00		2.20
NITROGEN TOT ORG N	MG/L	0.04	0.18	0.20	0.18	0.19	0.24	0.00	0.14	0.09	0.59
NITROGEN TOTKJD AS N	MG/L	0.04	0.18	0.20	0.20	0.20	0.25	0.00	0.15		0.59
NO2 + NO3 AS N TOT	MG/L	1.60	1.60	1.70	1.70	1.70	1.80	1.80	1.80		1.60
NO2+NO3 AS N DISS	MG/L	1.30	0.88	1.40	1.70	1.70	1.70	1.70	1.80		1.50
OXYGEN DISSOLVED	MG/L		2.40	6.30	2.00	7.50	3.00	2.90	2.80		7.40
PH FIELD			5.85	5.90	0.58	5.90	5.85	5.70	5.70	6.30	6.00
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.01	0.00	0.00	0.00	0.00	0.01	0.05	0.01		0.01
PHOSPHORUS TOT AS P	MG/L	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01		0.07
POTASSIUM DISS	MG/L	3.70	3.60	3.60	3.40	3.40	3.20	3.20	3.10	1.00	0.70
RESIDUE DIS CALC SUM	MG/L	154.00	150.00	147.00	146.00	151.00	149.00	147.00	148.00	39.00	39.00
SILICA DISSOLVED	MG/L	9.40	9.40	9.50	9.30	9.70	9.60	9.60	9.70	8.30	8.30
SODIUM DISS	MG/L	20.00	21.00	21.00	19.00	18.00	17.00	16.00	15.00	4.60	3.80
SP. CONDUCTANCE FLD		260.00	255.00	249.00	230.00	230.00	252.00	245.00	240.00	52.00	50.00
SULFATE DISS	MG/L	40.00	40.00	44.00	45.00	47.00	50.00	49.00	50.00	1.00	1.10
WATER TEMP (DEG C)		11.00	12.00	12.00	17.00	13.50	14.00	14.00	14.50	11.50	11.00
DEPTH TO WATER	FT	8.60	9.10	9.04	9.45	9.58	10.16	11.12	9.64		

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 1176	N 1176	N 1176	N 1176	N 1176	N 1176	N 1176	N 1183	N 1183	N 1183
		76 121	76 312	76 4 9	76 511	76 713	76 8 2	76 9 1	74 919	741121	75 328
ALK, TOT (AS CACO3)	MG/L	12.00	7.00	8.00	8.00	13.00	13.00	13.00	20.00	21.00	19.00
BICARBONATE	MG/L	15.00	8.00	10.00	10.00	16.00	16.00	16.00	24.40	26.00	23.00
CALCIUM DISS	MG/L	5.50	1.50	1.50	1.40	1.50	2.00	1.70	26.00	31.00	20.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	4.70	4.70	4.60	3.90	8.30	2.60	3.30	36.00	35.00	36.00
DETERGENTS (MBAS)	MG/L	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.27	0.30	0.14
FLUORIDE DISS	MG/L	0.00	0.10	0.00	0.00	0.00	0.10	0.00	0.20	0.10	0.00
HARDNESS NONCARB	MG/L	5.00	0.00	0.00	0.00	0.00	0.00	0.00	62.00	70.00	42.00
HARDNESS TOTAL	MG/L	17.00	7.00	7.00	7.00	6.00	8.00	8.00	82.00	91.00	61.00
IRON DISSOLVED	UG/L	650.00	230.00	470.00	260.00	160.00	280.00	370.00			
IRON TOTAL	UG/L	6100.00*	320.00*	690.00*	420.00*	300.00*	440.00*	530.00*	210.00*	210.00*	100.00*
MAGNESIUM DISS	MG/L	0.80	0.80	0.80	0.80	0.60	0.80	0.80	4.20	3.30	2.70
MANGANESE TOTAL	UG/L	70.00*	20.00*	20.00*	30.00*	10.00*	20.00*	30.00*	800.00*	910.00*	890.00*
NITR. NO2 AS N TOTAL	MG/L	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.06	
NITR. NO3 AS N TOTAL	MG/L	1.40	1.40	1.40	1.40	1.30	1.30	1.30	14.00	4.90	
NITROGEN NH4 ASN TOT	MG/L	0.00	0.00	0.01	0.00	0.01	0.01	0.05	1.10	2.00	1.30
NITROGEN NO2 ASN DIS	MG/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.06	0.01
NITROGEN NO3 ASN DIS	MG/L	1.40	1.30	1.40	1.20	1.30	1.30	1.20	14.00	4.00	7.70
NITROGEN TOT AS N	MG/L	1.40	1.40	1.50	1.40	1.30	1.30	1.30	16.00	6.90	
NITROGEN TOT ORG N	MG/L	0.00	0.00	0.07	0.00	0.00	0.02	0.00	0.90	0.00	0.90
NITROGEN TOTKJD AS N	MG/L	0.00	0.00	0.08	0.00	0.00	0.03	0.03	2.00	1.90	2.20
NO2 + NO3 AS N TOT	MG/L	1.40	1.40	1.40	1.40	1.30	1.30	1.30	14.00*	5.00	
NO2+NO3 AS N DISS	MG/L	1.40	1.30	1.40	1.20	1.30	1.30	1.20	14.00	4.10	
OXYGEN DISSOLVED	MG/L									0.35	0.50
PH FIELD		5.50	5.85	5.85	6.10	6.00	5.70	6.20	5.20	5.90	5.90
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	
PHOSPHORUS TOT AS P	MG/L	0.06	0.01	0.01	0.01	0.01	0.01	0.02	0.00	0.01	0.24
POTASSIUM DISS	MG/L	0.70	0.80	0.60	0.60	0.90	0.70	0.90	6.50	8.00	8.00
RESIDUE DIS CALC SUM	MG/L	39.00	30.00	32.00	30.00	38.00	32.00	35.00	240.00	216.00	187.00
SILICA DISSOLVED	MG/L	8.40	8.70	8.40	8.50	8.90	8.90	8.80	14.00	14.00	14.00
SODIUM DISS	MG/L	3.30	3.40	3.40	3.40	3.80	3.40	3.50	34.00	37.00	39.00
SP. CONDUCTANCE FLD		50.00	30.00	30.00	15.00	53.00	39.00	38.00	100.00	430.00	375.00
SULFATE DISS	MG/L	1.10	0.40	0.70	0.60	0.60	0.00	2.10	45.00	57.00	56.00
WATER TEMP (DEG C)		10.00	10.50	10.50	15.50	12.00	11.50	12.00	18.00	15.00	13.00
DEPTH TO WATER	FT	115.00	113.10	112.70	112.80	112.70	112.60	113.10			

CONSTITUENT		N 1183	N 1183	N 1183	N 1183	N 1183	N 1183	N 1183	N 1183	N 1183	N 1183
		75 710	75 8 7	75 9 2	7510 8	7511 4	7512 2	76 114	76 2 9	76 3 1	76 4 6
ALK, TOT (AS CACO3)	MG/L	16.00	12.00	17.00	15.00	19.00	20.00	17.00	16.00	18.00	26.00
BICARBONATE	MG/L	19.00	15.00	21.00	18.00	23.00	24.00	21.00	20.00	22.00	32.00
CALCIUM DISS	MG/L	20.00	16.00	16.00	18.00	20.00	19.00	18.00	19.00	23.00	16.00
CARBONATE	MG/L	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	23.00	11.00	18.00	31.00	30.00	26.00	27.00	27.00	24.00	39.00
DETERGENTS (MBAS)	MG/L	0.15	0.10	0.10	0.10	0.20	0.10	0.20	0.10	0.10	0.10
FLUORIDE DISS	MG/L	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.10	0.00
HARDNESS NONCARB	MG/L	48.00	37.00	35.00	46.00	48.00	39.00	41.00	45.00	53.00	26.00
HARDNESS TOTAL	MG/L	64.00	49.00	52.00	61.00	67.00	59.00	58.00	61.00	71.00	52.00
IRON DISSOLVED	UG/L					280.00	480.00	70.00	110.00	40.00	80.00
IRON TOTAL	UG/L	120.00*	120.00*	120.00*	130.00*	460.00*	970.00*	180.00*	140.00*	90.00*	150.00*
MAGNESIUM DISS	MG/L	3.30	2.20	2.90	3.90	4.20	2.80	3.10	3.30	3.20	3.00
MANGANESE TOTAL	UG/L	460.00*	490.00*	510.00*	590.00*	580.00*	500.00*	570.00*	610.00*	490.00*	410.00*
NITR. NO2 AS N TOTAL	MG/L		0.06	0.01	0.03	0.06	0.02	0.04	0.04	0.04	0.02
NITR. NO3 AS N TOTAL	MG/L		4.20	5.70	12.00	13.00	9.20	12.00	12.00	8.80	6.70
NITROGEN NH4 ASN TOT	MG/L	2.10	1.50	1.20	4.50	4.00	2.20	4.20	3.80	3.70	3.70
NITROGEN NO2 ASN DIS	MG/L	0.04	0.07	0.04	0.02	0.06	0.03	0.03	0.05	0.04	0.01
NITROGEN NO3 ASN DIS	MG/L	11.80	3.80	6.00	11.00	13.00	9.10	12.00	4.10	8.60	6.90
NITROGEN TOT AS N	MG/L		5.90	6.80	17.00	18.00	13.00	17.00	16.00	12.00	10.00
NITROGEN TOT ORG N	MG/L	0.10	0.10	0.00	0.40	0.50	1.30	0.60	0.00	0.00	0.00
NITROGEN TOTKJD AS N	MG/L	2.20	1.60	1.10	4.90	4.50	3.50	4.80	3.70	3.50	3.70
NO2 + NO3 AS N TOT	MG/L		4.30	5.70	12.00*	13.00*	9.20	12.00*	12.00*	8.80	6.70
NO2+NO3 AS N DISS	MG/L		3.90	6.00	11.00	13.00	9.10	12.00	4.10	8.60	6.90
OXYGEN DISSOLVED	MG/L	0.35	0.90	4.20	1.50	0.90	1.90	2.80	1.30	0.90	1.20
PH FIELD		5.30	5.55	5.40	5.60	5.50	5.70	5.65	5.65	5.80	5.80
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L		0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.00
PHOSPHORUS TOT AS P	MG/L	0.25	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01
POTASSIUM DISS	MG/L	5.00	3.70	4.10	7.80	7.40	5.40	5.90	5.30	4.80	4.90
RESIDUE DIS CALC SUM	MG/L	139.00	113.00	134.00	188.00	210.00	184.00	205.00	168.00	180.00	186.00
SILICA DISSOLVED	MG/L	11.00	9.60	9.30	8.00	10.00	10.00	9.20	8.60	8.40	7.90
SODIUM DISS	MG/L	24.00	12.00	15.00	24.00	27.00	23.00	27.00	27.00	24.00	30.00
SP. CONDUCTANCE FLD		368.00	234.00	233.00	355.00	385.00	335.00	360.00	325.00	300.00	322.00
SULFATE DISS	MG/L	43.00	34.00	32.00	38.00	42.00	45.00	51.00	50.00	44.00	39.00
WATER TEMP (DEG C)		13.00	13.00	17.00	17.00	17.00	16.50	15.00	14.00	14.00	10.00
DEPTH TO WATER	FT	14.40	14.20	14.80	14.70	15.10	15.00	14.35	13.55	13.90	14.00

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 1183	N 1183	N 1183	N 1183	N 1183	N 1184	N 1184	N 1184	N 1184	N 1185
		76 5 5	76 6 2	76 714	76 8 3	76 830	6910 2	74 327	741127	75 327	741127
ALK, TOT (AS CACO3)	MG/L	31.00	34.00	38.00	39.00	46.00	20.00		16.00	12.00	
BICARBONATE	MG/L	38.00	41.00	46.00	48.00	56.00	24.00		19.00	15.00	
CALCIUM DISS	MG/L	16.00	20.00	24.00	26.00	23.00			23.00	22.00	
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00				0.00	
CHLORIDE DISS	MG/L	31.00	29.00	34.00	34.00	33.00	31.00		35.00	37.00	
DETERGENTS (MBAS)	MG/L	0.20	0.20	0.20	0.20	0.20	0.14		0.20	0.20	
FLUORIDE DISS	MG/L	0.10	0.00	0.10	0.00	0.10			0.10	0.00	
HARDNESS NONCARB	MG/L	20.00	32.00	40.00	42.00	28.00	80.00		61.00	62.00	
HARDNESS TOTAL	MG/L	51.00	66.00	77.00	81.00	74.00	0.00		76.00	74.00	
IRON DISSOLVED	UG/L	70.00	60.00	90.00	90.00	110.00					
IRON TOTAL	UG/L	70.00*	140.00*	230.00*	160.00*	200.00*			700.00*	100.00*	
MAGNESIUM DISS	MG/L	2.80	3.80	4.20	4.00	4.10			4.60	4.60	
MANGANESE TOTAL	UG/L	410.00*	410.00*	540.00*	670.00*	790.00*			1200.00*	1100.00*	
NITR. NO2 AS N TOTAL	MG/L	0.03	0.02	0.01	0.02	0.02			0.01		
NITR. NO3 AS N TOTAL	MG/L	8.80	11.00	9.70	11.00	11.00					
NITROGEN NH4 ASN TOT	MG/L	6.80	6.90	4.00	4.90	5.70			4.40	3.30	
NITROGEN NO2 ASN DIS	MG/L	0.03	0.02	0.02	0.02	0.02			0.01	0.01	
NITROGEN NO3 ASN DIS	MG/L	10.00	10.00	11.00	11.00	11.00	9.30			9.60	
NITROGEN TOT AS N	MG/L	14.00	18.00	14.00	15.00	16.00					
NITROGEN TOT ORG N	MG/L	0.00	0.20	0.50	0.00	0.00				0.60	
NITROGEN TOTKJD AS N	MG/L	5.60	7.10	4.50	4.10	4.70			4.00	3.90	
NO2 + NO3 AS N TOT	MG/L	8.80	11.00*	9.70	11.00*	11.00*					
NO2+NO3 AS N DISS	MG/L	10.00	10.00	11.00	11.00	11.00					
OXYGEN DISSOLVED	MG/L	0.20	1.00	0.80	0.60	0.60				0.32	
PH FIELD		5.80	5.90	5.80	5.80	6.20	5.90		6.20	5.50	
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.00	0.00	0.01	0.01	0.01					
PHOSPHORUS TOT AS P	MG/L	0.01	0.01	0.02	0.04	0.01			0.01	0.26	
POTASSIUM DISS	MG/L	6.40	5.50	5.30	4.90	6.00			8.50	8.60	
RESIDUE DIS CALC SUM	MG/L	189.00	192.00	219.00	225.00	228.00			246.00	197.00	
SILICA DISSOLVED	MG/L	7.10	7.10	8.80	9.60	11.00			14.00	15.00	
SODIUM DISS	MG/L	26.00	25.00	30.00	31.00	31.00			37.00	33.00	
SP. CONDUCTANCE FLD		335.00	308.00	387.00	390.00	310.00	330.00			375.00	
SULFATE DISS	MG/L	37.00	37.00	41.00	43.00	43.00	78.00		72.00	69.00	
WATER TEMP (DEG C)		11.00	11.00	12.00	12.50	13.50			13.00	12.50	
DEPTH TO WATER	FT	14.45	14.79	15.98	16.08	15.38		11.30	13.39		10.51

CONSTITUENT		N 1185	N 1185	N 1185	N 1185	N 1185	N 1185	N 1194	N 1194	N 1194	N 1194
		75 327	75 8 1	76 1 8	76 317	76 629	76 920	691117	71 720	71 721	741112
ALK, TOT (AS CACO3)	MG/L	30.00	19.00		21.00	21.00	32.00	20.00	21.00	21.00	21.00
BICARBONATE	MG/L	36.00	23.00		25.00	26.00	39.00	24.00	26.00	26.00	25.00
CALCIUM DISS	MG/L	20.00	24.00		25.00	28.00	21.00		22.00	22.00	27.00
CARBONATE	MG/L				0.00	0.00	0.00		0.00		0.00
CHLORIDE DISS	MG/L	33.00	32.00		30.00	33.00	27.00	48.00	79.00	79.00	72.00
DETERGENTS (MBAS)	MG/L	0.27	0.33	0.37	0.32	0.15	0.29	0.03	0.06	0.06	0.10
FLUORIDE DISS	MG/L	0.10	0.10		0.10	0.10	0.10		0.00	0.00	0.10
HARDNESS NONCARB	MG/L	46.00	60.00		64.00	68.00	35.00	66.00	65.00	65.00	79.00
HARDNESS TOTAL	MG/L	75.00	79.00		84.00	90.00	67.00	86.00	86.00	86.00	100.00
IRON DISSOLVED	UG/L				50.00	90.00	130.00				
IRON TOTAL	UG/L	550.00*	580.00*		300.00*	170.00*	430.00*		340.00*		880.00*
MAGNESIUM DISS	MG/L	6.10	4.60		5.30	4.80	3.50		7.60	7.60	7.90
MANGANESE TOTAL	UG/L	670.00*	840.00*		760.00*	710.00*	820.00*		0.00		100.00*
NITR. NO2 AS N TOTAL	MG/L					0.01					0.00
NITR. NO3 AS N TOTAL	MG/L					27.00					3.20
NITROGEN NH4 ASN TOT	MG/L	3.80	6.90	4.00	2.35	3.00	4.70				0.11
NITROGEN NO2 ASN DIS	MG/L	0.01 <	0.01 <	0.01 <	0.01	0.02	0.02		0.00	0.00	0.00
NITROGEN NO3 ASN DIS	MG/L	8.70	25.00	14.50	29.50	25.00	15.20	1.60	1.40	1.40	3.20
NITROGEN TOT AS N	MG/L					30.00					3.40
NITROGEN TOT ORG N	MG/L	0.20	0.10	0.10	8.25	0.00	0.60		0.10		0.07
NITROGEN TOTKJD AS N	MG/L	4.00	7.00	4.10	10.60	3.00	5.30				0.18
NO2 + NO3 AS N TOT	MG/L					27.00*					3.20
NO2+NO3 AS N DISS	MG/L					27.00					3.20
OXYGEN DISSOLVED	MG/L				0.80	2.10	1.70				9.60
PH FIELD		5.60	5.25		5.80	5.40	5.70	6.00	6.40	6.40	7.40
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L										0.01
PHOSPHORUS TOT AS P	MG/L	0.28	0.24	0.18	0.05	0.05 <	0.01		0.06		0.02
POTASSIUM DISS	MG/L	8.60	12.00		8.70	10.00	12.00		2.20	2.20	2.20
RESIDUE DIS CALC SUM	MG/L	221.00	198.00		190.00	328.00	201.00		186.00	186.00	187.00
SILICA DISSOLVED	MG/L	17.00	17.00		18.00	19.00	18.00		10.00	10.00	12.00
SODIUM DISS	MG/L	47.00	52.00		40.00	47.00	41.00		30.00	30.00	24.00
SP. CONDUCTANCE FLD		500.00	575.00		450.00	445.00	500.00	240.00	360.00	360.00	375.00
SULFATE DISS	MG/L	71.00	45.00		51.00	54.00	59.00	18.00	16.00	16.00	15.00
WATER TEMP (DEG C)		12.00	16.50		10.50	13.00	16.00				11.00
DEPTH TO WATER	FT	9.00	9.50		8.72		9.69				

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 1194	N 1194	N 1194	N 1194	N 1194	N 1194	N 1194	N 1194	N 1194	N 1194
		75 912	751112	751215	76 121	76 218	76 315	76 4 8	76 510	76 6 7	76 7 8
ALK, TOT (AS CACO3)	MG/L	30.00	30.00	26.00	26.00	25.00	24.00	28.00	28.00	27.00	31.00
BICARBONATE	MG/L	36.00	36.00	32.00	32.00	30.00	29.00	34.00	34.00	33.00	38.00
CALCIUM DISS	MG/L	29.00	32.00	33.00	30.00	31.00	33.00	32.00	30.00	29.00	8.40
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	89.00	100.00	100.00	110.00	110.00	110.00	110.00	97.00	99.00	85.00
DETERGENTS (MBAS)	MG/L	0.00	0.00	0.00	0.80	0.00	0.10	0.00	0.00	0.10	0.10
FLUORIDE DISS	MG/L	0.10	0.00	0.00	0.10	0.10	0.00	0.00	0.00	0.00	0.10
HARDNESS NONCARB	MG/L	75.00	88.00	95.00	90.00	92.00	98.00	92.00	87.00	86.00	110.00
HARDNESS TOTAL	MG/L	100.00	120.00	120.00	120.00	120.00	120.00	120.00	120.00	110.00	140.00
IRON DISSOLVED	UG/L		700.00	1100.00	1100.00	990.00	1200.00	1400.00	1500.00	1900.00	1600.00
IRON TOTAL	UG/L	570.00*	1100.00*	1600.00*	1600.00*	1200.00*	1900.00*	1900.00*	1800.00*	1800.00*	1700.00*
MAGNESIUM DISS	MG/L	7.80	9.20	9.50	10.00	9.50	9.50	9.60	9.80	9.80	29.00
MANGANESE TOTAL	UG/L	20.00*	40.00*	40.00*	50.00*	60.00*	40.00*	30.00*	50.00*	30.00*	60.00*
NITR. NO2 AS N TOTAL	MG/L	0.00	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.07	0.01
NITR. NO3 AS N TOTAL	MG/L	2.80	2.10	1.70	2.20	2.40	2.30	2.40	2.30	3.20	2.50
NITROGEN NH4 ASN TOT	MG/L	0.01	0.01	0.01	0.02	0.01	0.04	0.03	0.02	0.04	0.03
NITROGEN NO2 ASN DIS	MG/L	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.01
NITROGEN NO3 ASN DIS	MG/L	2.30	2.30	1.20	2.30	2.40	1.20	2.30	2.10	2.40	2.60
NITROGEN TOT AS N	MG/L	2.90	2.20	1.80	2.30	2.60	2.40	2.60	2.60	3.60	2.70
NITROGEN TOT ORG N	MG/L	0.11	0.13	0.08	0.10	0.22	0.05	0.12	0.23	0.21	0.15
NITROGEN TOTKJD AS N	MG/L	0.12	0.14	0.09	0.12	0.23	0.09	0.15	0.25	0.25	0.18
NO2 + NO3 AS N TOT	MG/L	2.80	2.10	1.70	2.20	2.40	2.30	2.40	2.30	3.30	2.50
NO2+NO3 AS N DISS	MG/L	2.30	2.30	1.20	2.30	2.40	1.20	2.30	2.10	2.40	2.60
OXYGEN DISSOLVED	MG/L										
PH FIELD		5.55	5.50	5.85	5.80	5.40	5.70	5.80	5.70	5.70	5.70
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.01	0.02	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.01
PHOSPHORUS TOT AS P	MG/L	0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.01	0.02
POTASSIUM DISS	MG/L	2.80	3.60	3.40	3.80	3.60	3.90	3.70	3.60	3.50	3.50
RESIDUE DIS CALC SUM	MG/L	223.00	238.00	235.00	245.00	246.00	247.00	253.00	233.00	237.00	224.00
SILICA DISSOLVED	MG/L	12.00	12.00	12.00	12.00	12.00	13.00	12.00	12.00	13.00	13.00
SODIUM DISS	MG/L	34.00	33.00	34.00	34.00	35.00	37.00	37.00	35.00	33.00	32.00
SP. CONDUCTANCE FLD		420.00	438.00	365.00	460.00	370.00	455.00	435.00	350.00	360.00	340.00
SULFATE DISS	MG/L	20.00	20.00	21.00	18.00	18.00	20.00	20.00	18.00	21.00	21.00
WATER TEMP (DEG C)		12.00	13.00	11.00	9.50	10.00	12.00	10.00	12.00	13.00	13.00
DEPTH TO WATER	FT		80.60	80.62	81.00	79.50	79.48	79.08	79.09	78.72	79.28

CONSTITUENT		N 1194	N 1194	N 1194	N 1197	N 1197	N 1197	N 1197	N 1201	N 1201	N 1201
		76 812	76 9 7	7612 8	76 130	76 319	76 622	76 915	661119	69 911	72 515
ALK, TOT (AS CACO3)	MG/L	34.00	30.00	31.00	5.00	5.00	14.00	8.00	18.00	91.00	13.00
BICARBONATE	MG/L	42.00	37.00	38.00	6.00	6.00	17.00	10.00	22.00	110.00	16.00
CALCIUM DISS	MG/L	27.00	27.00	27.00	22.00	22.00	22.00	21.00			7.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00
CHLORIDE DISS	MG/L	72.00	70.00	72.00	22.00	23.00	23.00	28.00	26.00	51.00	8.50
DETERGENTS (MBAS)	MG/L	0.00	0.10	0.03	0.18	0.11	0.10	0.17	0.43	0.50	0.03
FLUORIDE DISS	MG/L	0.00	0.00	0.00	0.10	0.10	0.10	0.10			0.00
HARDNESS NONCARB	MG/L	62.00	65.00	63.00	60.00	62.00	53.00	57.00	60.00	0.00	10.00
HARDNESS TOTAL	MG/L	96.00	95.00	95.00	65.00	67.00	67.00	65.00	78.00	78.00	23.00
IRON DISSOLVED	UG/L	2200.00	1900.00	1200.00	360.00	390.00	400.00	470.00			
IRON TOTAL	UG/L	2300.00*	2100.00*	1400.00*	700.00*	720.00*	670.00*	570.00*			450.00*
MAGNESIUM DISS	MG/L	7.00	6.80	6.60	2.50	3.00	2.90	3.00			1.40
MANGANESE TOTAL	UG/L	60.00*	50.00*	30.00*	560.00*	580.00*	630.00*	600.00*			0.00
NITR. NO2 AS N TOTAL	MG/L	0.01	0.01				0.01				
NITR. NO3 AS N TOTAL	MG/L	2.30	2.50				14.00				
NITROGEN NH4 ASN TOT	MG/L	0.07	0.05	0.14	0.00	0.70	0.02	0.00			
NITROGEN NO2 ASN DIS	MG/L	0.01	0.01	0.01	< 0.01	0.02	0.01	< 0.01	0.00		0.00
NITROGEN NO3 ASN DIS	MG/L	1.90	1.80	1.30	10.50	18.50	16.00	16.70	15.00	4.80	0.01
NITROGEN TOT AS N	MG/L	2.50	2.60				14.00				
NITROGEN TOT ORG N	MG/L	0.11	0.03	1.54	0.28	4.34	0.00	0.00			0.00
NITROGEN TOTKJD AS N	MG/L	0.18	0.08	1.68	0.28	5.04	0.00	0.00			
NO2 + NO3 AS N TOT	MG/L	2.30	2.50				14.00*				
NO2+NO3 AS N DISS	MG/L	1.90	1.80	1.30			16.00				
OXYGEN DISSOLVED	MG/L				1.60	0.60		1.30			
PH FIELD		5.80	5.90	5.90	4.50	5.10	5.20	5.30	5.70	6.00	6.30
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.01	0.01				0.01				
PHOSPHORUS TOT AS P	MG/L	0.02	0.04	0.09	0.14	< 0.01	0.02	0.01			0.02
POTASSIUM DISS	MG/L	3.10	2.80	2.60	7.40	6.90	7.80	7.40			1.00
RESIDUE DIS CALC SUM	MG/L	201.00	194.00	192.00	157.00	160.00	236.00	172.00			46.00
SILICA DISSOLVED	MG/L	12.00	12.00	12.00	14.00	14.00	15.00	15.00			3.90
SODIUM DISS	MG/L	27.00	26.00	26.00	30.00	31.00	31.00	33.00			5.90
SP. CONDUCTANCE FLD		365.00	335.00	410.00	310.00	335.00	338.00	360.00	370.00	460.00	93.00
SULFATE DISS	MG/L	22.00	21.00	20.00	56.00	57.00	55.00	59.00		53.00	10.00
WATER TEMP (DEG C)		12.00	12.00	11.00	13.00	14.00	13.00	13.00	14.00		
DEPTH TO WATER	FT	78.46	79.94	81.20	39.05	39.33	40.56	41.09			

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 1201	N 1201	N 1201	N 1201	N 1201	N 1201	N 1201	N 1201	N 1201	N 1201
		75 710	75 8 7	75 9 2	7510 8	7511 3	7512 2	76 114	76 2 9	76 3 1	76 4 6
ALK, TOT (AS CACO3)	MG/L	5.00	8.00	12.00	16.00	19.00	20.00	13.00	11.00	13.00	11.00
BICARBONATE	MG/L	6.00	10.00	15.00	20.00	23.00	24.00	16.00	14.00	16.00	14.00
CALCIUM DISS	MG/L	16.00	3.80	2.00	1.40	1.90	2.00	2.00	4.00	4.50	8.50
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	86.00	22.00	3.00	1.50	1.30	1.30	1.30	1.90	2.90	17.00
DETERGENTS (MBAS)	MG/L	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FLUORIDE DISS	MG/L	0.30	0.00	0.20	0.00	0.10	0.00	0.10	0.10	0.10	0.00
HARDNESS NONCARB	MG/L	51.00	5.00	0.00	0.00	0.00	0.00	0.00	2.00	3.00	20.00
HARDNESS TOTAL	MG/L	56.00	13.00	11.00	5.00	5.00	6.00	8.00	13.00	16.00	32.00
IRON DISSOLVED	UG/L					750.00	590.00	200.00	110.00	120.00	180.00
IRON TOTAL	UG/L	230.00*	130.00*	420.00*	350.00*	930.00*	1600.00*	370.00*	230.00*	190.00*	310.00*
MAGNESIUM DISS	MG/L	3.90	0.80	1.50	0.40	0.10	0.30	0.70	0.80	1.20	2.50
MANGANESE TOTAL	UG/L	0.00	0.00	0.00	20.00*	20.00*	10.00*	0.00	0.00	10.00*	0.00
NITR. NO2 AS N TOTAL	MG/L	0.01	0.01	0.00	0.01	0.01	0.01	0.02	0.02	0.00	0.00
NITR. NO3 AS N TOTAL	MG/L	0.35	0.22	0.86	0.24	0.07	0.37	0.37	0.55	0.61	0.46
NITROGEN NH4 ASN TOT	MG/L	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.04	0.01	0.00
NITROGEN NO2 ASN DIS	MG/L	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.02	0.01	0.00
NITROGEN NO3 ASN DIS	MG/L	0.26	0.28	0.86	0.27	0.10	0.60	0.38	0.56	0.59	0.50
NITROGEN TOT AS N	MG/L	0.40	0.32	0.90	0.31	0.08	0.51	0.42	0.63	0.76	0.51
NITROGEN TOT ORG N	MG/L	0.04	0.09	0.04	0.06	0.00	0.10	0.00	0.02	0.14	0.05
NITROGEN TOTKJD AS N	MG/L	0.04	0.09	0.04	0.06	0.00	0.13	0.03	0.06	0.15	0.05
NO2 + NO3 AS N TOT	MG/L	0.36	0.23	0.86	0.25	0.08	0.38	0.39	0.57	0.61	0.46
NO2+NO3 AS N DISS	MG/L	0.27	0.29	0.86	0.27	0.11	0.61	0.39	0.58	0.60	0.50
OXYGEN DISSOLVED	MG/L	5.50		4.30	1.70	1.20	0.90	1.60	1.60	0.60	0.60
PH FIELD		5.75	6.20	6.10	6.35	6.35	6.35	5.95	5.70	6.50	6.10
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.00
PHOSPHORUS TOT AS P	MG/L	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01
POTASSIUM DISS	MG/L	3.40	1.60	1.20	1.00	1.40	1.00	1.00	1.20	1.00	1.50
RESIDUE DIS CALC SUM	MG/L	151.00	58.00	49.00	35.00	32.00	39.00	23.00	26.00	29.00	49.00
SILICA DISSOLVED	MG/L	2.50	2.50	2.40	0.90	2.10	11.00	2.70	2.80	2.90	3.00
SODIUM DISS	MG/L	33.00	16.00	12.00	9.50	8.80	6.80	3.30	2.30	2.10	3.00
SP. CONDUCTANCE FLD		307.00	141.00	76.00	75.00	75.00	50.00	50.00	30.00	50.00	85.00
SULFATE DISS	MG/L	2.20	5.40	15.00	9.20	4.20	1.80	2.20	3.20	4.10	4.30
WATER TEMP (DEG C)		15.50	15.00	15.00	17.00	14.50	15.00	15.50	15.00	15.50	15.00
DEPTH TO WATER	FT	16.90	15.40		15.60	15.40	15.50	15.00	14.50	14.80	14.83

CONSTITUENT		N 1201	N 1201	N 1201	N 1201	N 1201	N 1202	N 1202	N 1202	N 1202	N 1202
		76 5 4	76 6 2	76 714	76 811	76 9 7	66 9 8	6910 2	71 325	741119	75 327
ALK, TOT (AS CACO3)	MG/L	8.00	11.00	15.00	16.00	24.00	81.00	176.00	36.00	31.00	25.00
BICARBONATE	MG/L	10.00	14.00	18.00	19.00	29.00	99.00	210.00	44.00	38.00	31.00
CALCIUM DISS	MG/L	17.00	13.00	4.40	4.30	2.00	31.00			19.00	13.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00				0.00	0.00
CHLORIDE DISS	MG/L	45.00	50.00	32.00	35.00	9.10	62.00	67.00	27.00	25.00	19.00
DETERGENTS (MBAS)	MG/L	0.00	0.10	0.00	0.00	0.10	0.41	0.50	0.24	0.40	0.14
FLUORIDE DISS	MG/L	0.00	0.00	0.10	0.00	0.00				0.10	0.00
HARDNESS NONCARB	MG/L	54.00	36.00	2.00	0.00	0.00	16.00	0.00	26.00	27.00	16.00
HARDNESS TOTAL	MG/L	62.00	47.00	16.00	15.00	7.00	97.00	94.00	62.00	58.00	41.00
IRON DISSOLVED	UG/L	100.00	110.00	110.00	150.00	500.00					
IRON TOTAL	UG/L	150.00*	220.00*	150.00*	330.00*	580.00*				380.00*	1700.00*
MAGNESIUM DISS	MG/L	4.80	3.60	1.30	1.10	0.50	4.70			2.60	2.10
MANGANESE TOTAL	UG/L	10.00*	10.00*	0.00	10.00*	0.00				670.00*	640.00*
NITR. NO2 AS N TOTAL	MG/L	0.01	0.01	0.00	0.01	0.02				0.00	
NITR. NO3 AS N TOTAL	MG/L	0.82	0.62	0.38	0.43	0.72				9.90	
NITROGEN NH4 ASN TOT	MG/L	0.15	0.01	0.01	0.02	0.02				8.00	2.10
NITROGEN NO2 ASN DIS	MG/L	0.00	0.01	0.00	0.01	0.01	0.00		0.00	0.00	< 0.01
NITROGEN NO3 ASN DIS	MG/L	0.59	0.57	0.50	0.35	0.42	4.00	1.40	8.30	9.90	5.30
NITROGEN TOT AS N	MG/L	0.93	0.73	0.66	0.54	0.77				17.00	
NITROGEN TOT ORG N	MG/L	0.00	0.09	0.27	0.08	0.01				0.00	0.10
NITROGEN TOTKJD AS N	MG/L	0.10	0.10	0.28	0.10	0.03				7.00	2.20
NO2 + NO3 AS N TOT	MG/L	0.83	0.63	0.38	0.44	0.74				9.90	
NO2+NO3 AS N DISS	MG/L	0.59	0.58	0.50	0.36	0.43				9.90	
OXYGEN DISSOLVED	MG/L	6.70	0.80	3.00	1.80	2.30	0.80			0.00	1.60
PH FIELD		6.30	5.90	6.50	6.10	6.40	6.00	6.40	6.10	6.20	6.40
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.00	0.01	0.01	0.01	0.00					
PHOSPHORUS TOT AS P	MG/L	0.01	0.01	0.02	0.01	0.01				0.01	0.24
POTASSIUM DISS	MG/L	2.10	2.70	2.20	2.00	1.40	12.00			9.30	6.30
RESIDUE DIS CALC SUM	MG/L	88.00	104.00	83.00	96.00	72.00	282.00			229.00	137.00
SILICA DISSOLVED	MG/L	2.90	2.90	2.40	2.40	2.20	7.90			10.00	11.00
SODIUM DISS	MG/L	6.60	17.00	21.00	27.00	22.00	50.00			38.00	26.00
SP. CONDUCTANCE FLD		170.00	185.00	156.00	185.00	138.00	556.00	575.00	370.00	430.00	265.00
SULFATE DISS	MG/L	2.40	5.00	8.80	13.00	18.00	36.00	47.00	51.00	62.00	44.00
WATER TEMP (DEG C)		15.00	14.00	12.50	12.00	12.00	16.00		13.00	16.00	12.00
DEPTH TO WATER	FT	15.28	15.50	16.69	15.51	16.33				14.70	

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 1202	N 1202	N 1202	N 1202	N 1202	N 1204	N 1204	N 1204	N 1204	N 1204
		75 731	76 1 8	76 317	76 629	76 913	661117	68 619	75 327	75 731	76 1 8
ALK, TOT (AS CACO3)	MG/L	28.00	28.00	30.00	32.00	50.00	31.00	30.00	16.00	16.00	18.00
BICARBONATE	MG/L	34.00	32.00	36.00	39.00	66.00	38.00	37.00	19.00	19.00	22.00
CALCIUM DISS	MG/L	18.00	19.00	19.00	16.00	22.00			17.00	17.00	17.00
CARBONATE	MG/L	0.00		0.00	0.00	0.00			0.00	0.00	0.00
CHLORIDE DISS	MG/L	22.00	24.00	26.00	22.00	30.00	27.00	27.00	21.00	19.00	22.00
DETERGENTS (MBAS)	MG/L	0.13	0.16	0.16	0.10	0.24	1.80	1.40	0.28	0.37	0.38
FLUORIDE DISS	MG/L	0.00	0.00	0.00	0.00	0.00			0.00	0.10	0.10
HARDNESS NONCARB	MG/L	28.00	33.00	32.00	18.00	13.00	51.00	64.00	50.00	50.00	49.00
HARDNESS TOTAL	MG/L	96.00	59.00	61.00	50.00	67.00	82.00	94.00	65.00	65.00	67.00
IRON DISSOLVED	UG/L			210.00	770.00	820.00					
IRON TOTAL	UG/L	510.00*	1200.00*	470.00*	1000.00*	1000.00*			170.00*	100.00*	160.00*
MAGNESIUM DISS	MG/L	2.70	2.80	3.30	2.40	3.00			5.50	5.50	6.00
MANGANESE TOTAL	UG/L	800.00*	90.00*	810.00*	650.00*	700.00*			140.00*	110.00*	110.00*
NITR. NO2 AS N TOTAL	MG/L				0.01						
NITR. NO3 AS N TOTAL	MG/L				5.40						
NITROGEN NH4 ASN TOT	MG/L	2.10	2.10	1.89	1.90	4.20			0.30	0.35	0.00
NITROGEN NO2 ASN DIS	MG/L	< 0.01	< 0.01	< 0.01	0.00	< 0.01	0.00		0.01	0.01	< 0.01
NITROGEN NO3 ASN DIS	MG/L	10.20	6.60	1.80	5.40	8.00	8.80	19.00	7.80	7.70	8.00
NITROGEN TOT AS N	MG/L				7.30						
NITROGEN TOT ORG N	MG/L	1.30	0.70	1.47	0.00	5.60			2.50	1.00	0.28
NITROGEN TOTKJD AS N	MG/L	3.40	2.80	3.36	1.90	9.80			2.80	1.40	0.28
NO2 + NO3 AS N TOT	MG/L				5.40						
NO2+NO3 AS N DISS	MG/L				5.40						
OXYGEN DISSOLVED	MG/L	4.60		7.80	1.40	6.60			4.20	1.10	4.60
PH FIELD		6.10	5.90	5.90	5.80	5.90	6.00	6.30	5.80	5.55	5.70
PHENOLS	UG/L				0.01						
PHOS ORTHO TOT AS P	MG/L				0.00						
PHOSPHORUS TOT AS P	MG/L	0.24	0.13	0.03		< 0.01			0.16	0.24	0.08
POTASSIUM DISS	MG/L		5.30	5.40	5.50	9.30			2.40	2.30	2.20
RESIDUE DIS CALC SUM	MG/L	14.00	147.00	165.00	180.00	230.00			127.00	121.00	139.00
SILICA DISSOLVED	MG/L	10.00	10.00	11.00	10.00	11.00			19.00	18.00	19.00
SODIUM DISS	MG/L	29.00	24.00	28.00	29.00	41.00			17.00	19.00	18.00
SP. CONDUCTANCE FLD		350.00	390.00	250.00	260.00	240.00	420.00	440.00	265.00	175.00	312.00
SULFATE DISS	MG/L	37.00	46.00	55.00	51.00	80.00		56.00	36.00	31.00	34.00
WATER TEMP (DEG C)		20.00	13.00	12.00	15.50	17.50	14.00	14.00	13.50	14.50	12.00
DEPTH TO WATER	FT	12.70	12.85	12.38	14.72	13.55			11.60	10.50	10.10

CONSTITUENT		N 1204	N 1204	N 1204	N 1205	N 1205	N 1205	N 1205	N 1220A	N 1220A	N 1220A
		76 317	76 629	76 913	75 327	76 317	76 629	76 913	75 730	76 1 8	76 315
ALK, TOT (AS CACO3)	MG/L	17.00	18.00	21.00	47.00	62.00	52.00	55.00	33.00	11.00	18.00
BICARBONATE	MG/L	21.00	22.00	26.00	57.00	76.00	63.00	67.00	40.00	14.00	22.00
CALCIUM DISS	MG/L	17.00	19.00	18.00	29.00	24.00	24.00	28.00	24.00	20.00	21.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	22.00	20.00	19.00	110.00	81.00	90.00	98.00	28.00	30.00	35.00
DETERGENTS (MBAS)	MG/L	0.45	0.26	0.43	0.14	0.30	0.13	0.20	0.26	0.23	0.30
FLUORIDE DISS	MG/L	0.10	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.20	0.10
HARDNESS NONCARB	MG/L	51.00	56.00	47.00	53.00	22.00	31.00	39.00	41.00	51.00	48.00
HARDNESS TOTAL	MG/L	68.00	74.00	68.00	100.00	85.00	82.00	94.00	74.00	62.00	66.00
IRON DISSOLVED	UG/L	20.00	80.00	100.00		540.00	590.00	600.00			60.00
IRON TOTAL	UG/L	110.00*	100.00*	230.00*	1000.00*	560.00*	650.00*	1100.00*	110.00*	110.00*	100.00*
MAGNESIUM DISS	MG/L	6.20	6.40	5.70	6.70	6.00	5.40	5.80	3.40	3.00	3.20
MANGANESE TOTAL	UG/L	140.00*	130.00*	130.00*	2500.00*	2400.00*	2300.00*	3200.00*	1300.00*	350.00*	1700.00*
NITR. NO2 AS N TOTAL	MG/L		0.02				0.00				
NITR. NO3 AS N TOTAL	MG/L		7.80				0.05				
NITROGEN NH4 ASN TOT	MG/L	0.28	0.90	0.00	2.10	1.96	0.80	3.20	5.00	4.50	4.41
NITROGEN NO2 ASN DIS	MG/L	0.01	0.03	0.02	< 0.01	< 0.01	0.01	< 0.01	0.02	< 0.01	< 0.01
NITROGEN NO3 ASN DIS	MG/L	13.50	6.50	7.40	< 0.10	0.10	0.30	< 0.10	9.00	13.40	8.00
NITROGEN TOT AS N	MG/L		8.00				3.50				
NITROGEN TOT ORG N	MG/L	0.84	1.10	0.00	6.00	3.36	0.00	1.30	1.40	0.10	1.19
NITROGEN TOTKJD AS N	MG/L	1.12	2.00	0.00	8.10	5.32	0.80	4.50	6.40	4.60	5.60
NO2 + NO3 AS N TOT	MG/L		7.80				0.05				
NO2+NO3 AS N DISS	MG/L		7.90				0.06				
OXYGEN DISSOLVED	MG/L	0.90	1.90	0.60	0.32	0.80	2.10	0.70	1.40	2.10	0.90
PH FIELD		5.70	5.70	6.00	6.20	6.30	6.10	6.50	5.70	5.00	5.50
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L										
PHOSPHORUS TOT AS P	MG/L	0.05	0.08	0.06	0.22	0.12	0.15	0.03	0.25	0.04	0.05
POTASSIUM DISS	MG/L	2.30	2.20	2.30	4.80	4.30	4.30	5.00	9.20	8.60	7.60
RESIDUE DIS CALC SUM	MG/L	130.00	171.00	138.00	318.00	295.00	297.00	315.00	208.00	202.00	201.00
SILICA DISSOLVED	MG/L	20.00	20.00	19.00	21.00	22.00	23.00	24.00	13.00	17.00	13.00
SODIUM DISS	MG/L	18.00	17.00	19.00	60.00	58.00	60.00	60.00	35.00	34.00	37.00
SP. CONDUCTANCE FLD		212.00	225.00	290.00	540.00	470.00	455.00	640.00	465.00	487.00	390.00
SULFATE DISS	MG/L	34.00	40.00	42.00	58.00	62.00	58.00	61.00	76.00	82.00	73.00
WATER TEMP (DEG C)		11.00	12.00	13.50	15.00	12.50	13.50	18.00	15.00	13.50	13.00
DEPTH TO WATER	FT	10.27		12.81	7.90	6.39		6.28	13.30	13.60	13.95

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 1220A 76 625	N 1220A 76 910	N 1222 741115	N 1222 75 325	N 1222 75 730	N 1222 76 1 8	N 1222 76 315	N 1222 76 625	N 1222 76 910	N 1223 70 5 4
ALK, TOT (AS CACO3)	MG/L	10.00	32.00	31.00	35.00	31.00	34.00	33.00	37.00	36.00	
BICARBONATE	MG/L	12.00	39.00	38.00	43.00	38.00	42.00	40.00	45.00	44.00	
CALCIUM DISS	MG/L	23.00	24.00	22.00	23.00	24.00	21.00	28.00	27.00	21.00	
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
CHLORIDE DISS	MG/L	31.00	34.00	52.00	30.00	31.00	32.00	36.00	36.00	28.00	23.00
DETERGENTS (MBAS)	MG/L	0.20	0.23	0.34	0.22	0.22	0.24	0.30	0.20	0.33	0.86
FLUORIDE DISS	MG/L	0.10	0.00	0.10	0.10	0.10	0.00	0.00	0.00	0.00	
HARDNESS NONCARB	MG/L	62.00	42.00	35.00	32.00	39.00	31.00	52.00	44.00	25.00	
HARDNESS TOTAL	MG/L	72.00	74.00	66.00	68.00	71.00	65.00	85.00	81.00	61.00	44.00
IRON DISSOLVED	UG/L	100.00	110.00					100.00	170.00	160.00	
IRON TOTAL	UG/L	150.00*	140.00*	160.00*	180.00*	150.00*	230.00*	140.00*	240.00*	190.00*	
MAGNESIUM DISS	MG/L	3.50	3.40	2.80	2.50	2.60	3.10	3.70	3.20	2.10	
MANGANESE TOTAL	UG/L	1400.00*	1700.00*	830.00*	860.00*	780.00*	520.00*	890.00*	880.00*	800.00*	
NITR. NO2 AS N TOTAL	MG/L	0.02		0.00					0.03		
NITR. NO3 AS N TOTAL	MG/L	11.00		12.00					6.70		
NITROGEN NH4 ASN TOT	MG/L	5.40	5.30	3.80	2.50	2.80	2.20	3.29	2.70	2.52	
NITROGEN NO2 ASN DIS	MG/L	0.03	0.01	0.00	0.06	< 0.01	0.06	< 0.01	0.01	< 0.01	
NITROGEN NO3 ASN DIS	MG/L	11.00	14.50	7.70	8.60	10.60	8.00	6.80	5.60	6.70	0.60
NITROGEN TOT AS N	MG/L	16.00		15.00					9.60		
NITROGEN TOT ORG N	MG/L	0.00	1.40	0.00	0.90	0.60	0.60	0.91	0.20	2.24	
NITROGEN TOTKJD AS N	MG/L	4.80	6.70	3.40	3.40	3.40	2.80	4.20	2.90	4.76	
NO2 + NO3 AS N TOT	MG/L	11.00*		12.00*					6.70		
NO2+NO3 AS N DISS	MG/L	11.00		7.70					5.60		
OXYGEN DISSOLVED	MG/L	3.80	1.10	0.55	1.80	1.30	3.80	1.30	2.30	1.40	
PH FIELD		5.60	5.80	5.80	5.10	6.90	5.70	5.90	5.90	6.10	7.00
PHENOLS	UG/L								0.01		
PHOS ORTHO TOT AS P	MG/L	0.01		0.01							
PHOSPHORUS TOT AS P	MG/L	0.01	0.02	0.01	0.18	0.21	0.10	0.05	0.01	0.08	
POTASSIUM DISS	MG/L	8.30	8.80	4.30	6.90	7.20	6.80	8.00	6.50	5.80	
RESIDUE DIS CALC SUM	MG/L	252.00	223.00	213.00	161.00	156.00	168.00	193.00	213.00	155.00	
SILICA DISSOLVED	MG/L	14.00	14.00	6.60	7.30	7.00	6.60	7.20	6.80	6.50	
SODIUM DISS	MG/L	38.00	41.00	32.00	26.00	28.00	30.00	29.00	30.00	29.00	
SP. CONDUCTANCE FLD		345.00	510.00	540.00	330.00	390.00	390.00	390.00	320.00	355.00	212.00
SULFATE DISS	MG/L	79.00	78.00	40.00	44.00	37.00	48.00	61.00	56.00	41.00	
WATER TEMP (DEG C)		14.00	14.00	15.00	11.00	16.00	13.00	11.00	14.50	16.00	
DEPTH TO WATER	FT	17.09	15.81		11.00	11.30	11.20	11.11	11.88	11.88	

CONSTITUENT		N 1223	N 1232	N 1232	N 1232	N 1232	N 1235	N 1235	N 1235	N 1235	N 1235
		741115	76 130	76 322	76 623	76 915	69 827	741121	75 325	75 731	76 1 8
ALK, TOT (AS CACO3)	MG/L	75.00	3.00	3.00	10.00	11.00	5.00	4.00	7.00	5.00	11.00
BICARBONATE	MG/L	92.00	4.00	4.00	12.00	13.00	6.00	5.00	8.00	6.00	14.00
CALCIUM DISS	MG/L	20.00	11.00	7.00	11.00	8.20		19.00	19.00	12.00	14.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	26.00	34.00	21.00	23.00	18.00	6.00	16.00	27.00	12.00	19.00
DETERGENTS (MBAS)	MG/L	1.30	0.07	0.08	< 0.01	0.14	0.05	0.10	0.09	0.03	0.22
FLUORIDE DISS	MG/L	0.10	0.00	0.00	0.10	0.10		0.10	0.10	0.00	0.10
HARDNESS NONCARB	MG/L	0.00	28.00	18.00	25.00	16.00	35.00	53.00	50.00	30.00	27.00
HARDNESS TOTAL	MG/L	71.00	31.00	22.00	34.00	26.00	40.00	57.00	57.00	35.00	38.00
IRON DISSOLVED	UG/L		200.00	230.00	260.00	240.00					
IRON TOTAL	UG/L	470.00*	1800.00*	2800.00*	1200.00*	400.00*		2000.00*	1200.00*	470.00*	440.00*
MAGNESIUM DISS	MG/L	5.00	0.90	1.00	1.70	1.40		2.40	2.20	1.30	0.80
MANGANESE TOTAL	UG/L	2400.00*	110.00*	80.00*	110.00*	80.00*		50.00*	70.00*	40.00*	40.00*
NITR. NO2 AS N TOTAL	MG/L	0.00			0.00			0.00			
NITR. NO3 AS N TOTAL	MG/L	2.10			7.60			8.40			
NITROGEN NH4 ASN TOT	MG/L	12.00	0.00	0.00	0.90	0.00		0.05	0.00	0.21	0.00
NITROGEN NO2 ASN DIS	MG/L	0.00	0.01	< 0.01	0.01	0.02		0.00	< 0.01	< 0.01	< 0.01
NITROGEN NO3 ASN DIS	MG/L	2.10	3.90	3.90	8.60	5.70	2.00	8.40	9.10	5.30	21.00
NITROGEN TOT AS N	MG/L	13.00			7.60			8.50			
NITROGEN TOT ORG N	MG/L	0.00	0.56	0.00	5.00	0.00		0.04	0.84	1.20	0.28
NITROGEN TOTKJD AS N	MG/L	11.00	0.56	0.00	5.90	0.00		0.09	0.84	1.40	0.28
NO2 + NO3 AS N TOT	MG/L	2.10			7.60			8.40			
NO2+NO3 AS N DISS	MG/L	2.10			7.70			8.40			
OXYGEN DISSOLVED	MG/L	0.55	5.50	5.00		4.70		0.30		6.50	3.60
PH FIELD		6.20	4.70	5.40	4.50	5.40	5.80	5.60	5.40	5.70	5.90
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.01			0.01			0.00			
PHOSPHORUS TOT AS P	MG/L	0.13	0.48	0.10	0.04	0.12		0.01	0.22	0.23	0.14
POTASSIUM DISS	MG/L	6.80	4.00	3.30	4.10	3.30		3.70	4.60	3.70	4.10
RESIDUE DIS CALC SUM	MG/L	248.00	87.00	73.00	126.00	78.00		122.00	113.00	69.00	89.00
SILICA DISSOLVED	MG/L	8.20	3.90	4.30	4.70	4.80		4.60	5.20	4.20	4.80
SODIUM DISS	MG/L	45.00	17.00	15.00	21.00	17.00		12.00	20.00	11.00	14.00
SP. CONDUCTANCE FLD		485.00	180.00	138.00	165.00	185.00	150.00	241.00	265.00	175.00	215.00
SULFATE DISS	MG/L	82.00	14.00	19.00	20.00	19.00	30.00	25.00	31.00	22.00	25.00
WATER TEMP (DEG C)		15.00	12.50	13.50	14.00	12.50	13.00	13.00	12.50	18.00	13.50
DEPTH TO WATER	FT	3.53	29.70	30.12		31.30			18.90	15.00	16.30

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 1235	N 1235	N 1235	N 1236	N 1236	N 1236	N 1236	N 1236	N 1240	N 1240
		76 317	76 629	76 910	69 827	75 729	76 317	76 625	76 910	70 5 4	741115
ALK, TOT (AS CACO3)	MG/L	5.00	13.00	13.00	14.00	7.00	5.00	15.00	33.00		46.00
BICARBONATE	MG/L	6.00	16.00	16.00	17.00	8.00	6.00	18.00	40.00		56.00
CALCIUM DISS	MG/L	15.00	21.00	19.00		13.00	20.00	23.00	24.00		23.00
CARBONATE	MG/L	0.00	0.00	0.00		0.00	0.00	0.00	0.00		0.00
CHLORIDE DISS	MG/L	17.00	19.00	20.00	18.00	12.00	17.00	17.00	19.00	22.00	39.00
DETERGENTS (MBAS)	MG/L	0.10	< 0.10	0.08	0.07	0.11	0.20	0.20	0.18	0.10	0.20
FLUORIDE DISS	MG/L	0.10	0.10	0.10		0.00	0.00	0.00	0.10		0.10
HARDNESS NONCARB	MG/L	41.00	51.00	44.00	82.00	43.00	62.00	57.00	43.00		23.00
HARDNESS TOTAL	MG/L	46.00	64.00	57.00	96.00	49.00	66.00	72.00	76.00	88.00	69.00
IRON DISSOLVED	UG/L	200.00	490.00	550.00			300.00	1500.00	860.00		
IRON TOTAL	UG/L	360.00*	650.00*	740.00*		1600.00*	*16000.*	*12000.*	8300.00*		240.00*
MAGNESIUM DISS	MG/L	2.00	2.90	2.40		4.10	4.00	3.50	3.90		2.70
MANGANESE TOTAL	UG/L	30.00*	40.00*	30.00*		380.00*	300.00*	340.00*	370.00*		490.00*
NITR. NO2 AS N TOTAL	MG/L		0.02					0.04			0.01
NITR. NO3 AS N TOTAL	MG/L		9.10					11.00			2.70
NITROGEN NH4 ASN TOT	MG/L	0.14	1.40	0.00		0.14	0.08	0.08	0.35		0.65
NITROGEN NO2 ASN DIS	MG/L	< 0.01	0.02	0.02		0.03	0.04	0.04	0.01		0.00
NITROGEN NO3 ASN DIS	MG/L	6.90	7.80	6.50	10.00	9.70	11.00	11.00	2.60	1.20	2.70
NITROGEN TOT AS N	MG/L		9.10					11.00			3.30
NITROGEN TOT ORG N	MG/L	0.70	0.00	0.00		0.42	0.32	0.32	1.33		0.00
NITROGEN TOTKJD AS N	MG/L	0.84	1.40	0.00		0.56	0.40	0.40	1.68		0.63
NO2 + NO3 AS N TOT	MG/L		9.10					11.00*			2.70
NO2+NO3 AS N DISS	MG/L		9.30					11.00			2.70
OXYGEN DISSOLVED	MG/L	6.50	3.10	3.60		1.50	3.10	0.90	1.40		0.50
PH FIELD		6.00	5.80	5.90	6.10	5.30	7.60	5.30	5.60	6.70	6.30
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L							0.01			0.01
PHOSPHORUS TOT AS P	MG/L	< 0.01	0.05	< 0.01		0.32	0.01	0.01	0.12		0.01
POTASSIUM DISS	MG/L	3.50	4.30	4.40		4.20	4.00	4.70	4.00		2.00
RESIDUE DIS CALC SUM	MG/L	83.00	158.00	131.00		99.00	115.00	179.00	158.00		187.00
SILICA DISSOLVED	MG/L	4.70	6.00	6.30		14.00	14.00	13.00	13.00		14.00
SODIUM DISS	MG/L	13.00	16.00	19.00		9.60	14.00	16.00	17.00		33.00
SP. CONDUCTANCE FLD		180.00	210.00	285.00	330.00	275.00	230.00	220.00	320.00	240.00	350.00
SULFATE DISS	MG/L	25.00	39.00	51.00	59.00	38.00	39.00	43.00	56.00		34.00
WATER TEMP (DEG C)		11.00	12.00	13.00	15.00	15.00	13.00	13.00	12.50		14.50
DEPTH TO WATER	FT	16.28		18.10		24.00	23.70	25.50	25.48		

CONSTITUENT		N 1240	N 1240	N 1240	N 1240	N 1240	N 1240	N 1250	N 1250	N 1250	N 1250
		75 319	75 729	76 1 8	76 315	76 625	76 910	741114	75 219	75 319	75 422
ALK, TOT (AS CACO3)	MG/L	43.00	54.00	79.00	71.00	51.00	74.00	23.00		23.00	
BICARBONATE	MG/L	53.00	66.00	96.00	86.00	62.00	90.00	28.00		28.00	
CALCIUM DISS	MG/L	35.00	26.00	35.00	33.00	48.00	26.00	22.00		18.00	
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	
CHLORIDE DISS	MG/L	88.00	18.00	28.00	30.00	210.00	33.00	24.00		20.00	
DETERGENTS (MBAS)	MG/L	0.18	0.36	0.47	0.27	0.20	0.38	0.10	0.10	0.15	0.16
FLUORIDE DISS	MG/L	0.20	0.20	0.10	0.00	0.00	0.10	0.00		0.10	
HARDNESS NONCARB	MG/L	63.00	26.00	29.00	29.00	120.00	8.00	45.00		33.00	
HARDNESS TOTAL	MG/L	110.00	80.00	110.00	99.00	170.00	82.00	68.00		56.00	
IRON DISSOLVED	UG/L				190.00	310.00	380.00			0.00	
IRON TOTAL	UG/L	260.00*	190.00*	530.00*	320.00*	420.00*	510.00*	500.00*		600.00*	
MAGNESIUM DISS	MG/L	4.60	3.60	5.00	4.10	12.00	4.20	3.20		2.60	
MANGANESE TOTAL	UG/L	470.00*	770.00*	1100.00*	1400.00*	1000.00*	880.00*	1800.00*		1400.00*	
NITR. NO2 AS N TOTAL	MG/L					0.02		0.01			
NITR. NO3 AS N TOTAL	MG/L					3.60		98.00			
NITROGEN NH4 ASN TOT	MG/L	0.00	0.63	0.28	1.33	0.88	0.77	2.50	1.90	1.70	0.00
NITROGEN NO2 ASN DIS	MG/L	0.02	0.01 <	0.01 <	0.01	0.02 <	0.01	0.01	0.01	0.01	0.01
NITROGEN NO3 ASN DIS	MG/L	4.60	3.10	5.60	4.90	2.80	16.50	12.00	6.20	6.40	6.00
NITROGEN TOT AS N	MG/L					4.90		0.00		0.00	
NITROGEN TOT ORG N	MG/L	0.28	1.10	0.84	0.35	0.42	0.77	0.00	0.60	0.20	2.80
NITROGEN TOTKJD AS N	MG/L	0.28	0.17	1.12	1.68	1.30	1.54	2.30	2.50	1.90	2.80
NO2 + NO3 AS N TOT	MG/L					3.60		98.00*			
NO2+NO3 AS N DISS	MG/L					2.80		10.00			
OXYGEN DISSOLVED	MG/L	0.85	2.40	6.10	2.40	2.60	1.10	0.40	0.40	0.50	2.30
PH FIELD		6.20	6.20	6.30	6.20	6.05	6.40	6.20	6.40	6.30	5.80
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L					0.01					
PHOSPHORUS TOT AS P	MG/L <	0.10	0.33	0.08	0.25	0.01	0.10	0.01	0.00 <	0.10	0.26
POTASSIUM DISS	MG/L	2.50	1.80	2.70	2.50	3.80	1.90	5.40		5.80	
RESIDUE DIS CALC SUM	MG/L	256.00	157.00	235.00	225.00	476.00	208.00	182.00		137.00	
SILICA DISSOLVED	MG/L	13.00	12.00	23.00	21.00	15.00	18.00	8.50		9.30	
SODIUM DISS	MG/L	50.00	24.00	35.00	34.00	100.00	38.00	23.00		21.00	
SP. CONDUCTANCE FLD		510.00	320.00	455.00	370.00	865.00	420.00	320.00	280.00	270.00	275.00
SULFATE DISS	MG/L	37.00	39.00	59.00	58.00	44.00	42.00	38.00		46.00	
WATER TEMP (DEG C)		12.00	16.00	13.00	11.00	13.00	14.00	14.50	14.00	12.50	13.50
DEPTH TO WATER	FT	11.10	13.50	11.30	11.17	12.50	12.36	16.60	14.83	14.30	13.80

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 1250 75 521	N 1250 75 624	N 1250 75 724	N 1250 75 9 5	N 1250 7510 8	N 1250 7511 4	N 1250 7512 3	N 1250 76 1 7	N 1250 76 2 5	N 1250 76 3 2
ALK, TOT (AS CACO3)	MG/L			21.00	21.00	22.00	21.00	21.00	20.00	20.00	18.00
BICARBONATE	MG/L			26.00	26.00	27.00	25.00	26.00	24.00	24.00	22.00
CALCIUM DISS	MG/L			15.00	15.00	14.00	15.00	18.00	18.00	18.00	17.00
CARBONATE	MG/L			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L			20.00	18.00	19.00	22.00	28.00	39.00	42.00	38.00
DETERGENTS (MBAS)	MG/L	0.13	0.16	0.15	0.20	0.10	0.10	0.10	0.10	0.10	0.20
FLUORIDE DISS	MG/L			0.10	0.10	0.00	0.00	0.00	0.10	0.00	0.10
HARDNESS NONCARB	MG/L			27.00	26.00	23.00	25.00	34.00	36.00	37.00	35.00
HARDNESS TOTAL	MG/L			48.00	47.00	45.00	46.00	55.00	56.00	57.00	53.00
IRON DISSOLVED	UG/L						1100.00	780.00	230.00	230.00	340.00
IRON TOTAL	UG/L			380.00*	450.00*	560.00*	1400.00*	3800.00*	450.00*	290.00*	370.00*
MAGNESIUM DISS	MG/L			2.60	2.30	2.50	2.00	2.40	2.70	2.90	2.60
MANGANESE TOTAL	UG/L			1400.00*	1300.00*	1300.00*	1400.00*	1400.00*	180.00*	1600.00*	1500.00*
NITR. NO2 AS N TOTAL	MG/L				0.00	0.01	0.01	0.01	0.00	0.00	0.00
NITR. NO3 AS N TOTAL	MG/L				4.80	4.00	55.00	7.10	8.20	7.90	8.90
NITROGEN NH4 ASN TOT	MG/L	1.60	2.00	1.50	1.40	2.10	2.30	2.70	3.50	3.80	3.80
NITROGEN NO2 ASN DIS	MG/L	< 0.01	< 0.01	< 0.01	0.03	0.00	0.01	0.01	0.01	0.00	0.01
NITROGEN NO3 ASN DIS	MG/L	5.90	5.00	4.30	4.80	3.80	5.20	6.30	7.30	7.80	8.50
NITROGEN TOT AS N	MG/L				7.00	6.10	57.00	9.80	12.00	11.00	13.00
NITROGEN TOT ORG N	MG/L	1.20	1.60	1.30	0.80	0.00	0.00	0.00	0.00	0.00	0.00
NITROGEN TOTKJD AS N	MG/L	2.80	3.60	2.80	2.20	2.10	2.30	2.70	3.50	3.40	3.70
NO2 + NO3 AS N TOT	MG/L				4.80	4.00	55.00*	7.10	8.20	7.90	8.90
NO2+NO3 AS N DISS	MG/L				4.80	3.80	5.20	6.30	7.30	7.80	8.50
OXYGEN DISSOLVED	MG/L	0.90	1.80	3.30	3.60	1.40	2.00	1.80		2.30	6.50
PH FIELD		6.00	6.60	5.90	5.60	5.30	5.60	5.60	5.50	5.60	6.00
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L				0.01	0.00	0.01	0.01	0.01	0.00	0.00
PHOSPHORUS TOT AS P	MG/L	0.30	0.21	0.24	0.04	0.01	0.01	0.02	0.01	0.02	0.02
POTASSIUM DISS	MG/L			7.00	6.40	6.70	6.90	6.30	7.10	7.40	7.30
RESIDUE DIS CALC SUM	MG/L			121.00	139.00	135.00	142.00	152.00	168.00	180.00	177.00
SILICA DISSOLVED	MG/L			8.90	8.80	8.10	8.50	9.10	9.50	9.10	8.30
SODIUM DISS	MG/L			18.00	18.00	18.00	18.00	18.00	20.00	24.00	25.00
SP. CONDUCTANCE FLD		290.00	262.00	285.00	238.00	280.00	265.00	295.00	355.00	300.00	300.00
SULFATE DISS	MG/L			37.00	36.00	37.00	33.00	29.00	27.00	30.00	30.00
WATER TEMP (DEG C)		13.70	17.00	17.00	17.00	17.00	17.00	15.00	13.50	12.00	11.50
DEPTH TO WATER	FT	13.70	12.40				14.10	13.70	9.90	12.20	12.70

CONSTITUENT		N 1250	N 1250	N 1250	N 1250	N 1250	N 1250	N 1250	N 1251	N 1251	N 1251
		76 4 7	76 5 4	76 6 3	76 7 2	76 811	76 9 8	7612 2	6612 8	71 325	72 512
ALK, TOT (AS CACO3)	MG/L	20.00	21.00	18.00	16.00	17.00	16.00		66.00	99.00	104.00
BICARBONATE	MG/L	24.00	25.00	22.00	20.00	21.00	20.00		80.00	121.00	127.00
CALCIUM DISS	MG/L	14.00	14.00	13.00	17.00	20.00	21.00				14.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00				0.00
CHLORIDE DISS	MG/L	31.00	22.00	20.00	16.00	23.00	25.00		19.00	48.00	21.00
DETERGENTS (MBAS)	MG/L	0.20	0.20	0.20	0.20	0.20	0.20	0.18	1.60	0.81	0.52
FLUORIDE DISS	MG/L	0.00	0.00	0.00	0.10	0.00	0.00				0.10
HARDNESS NONCARB	MG/L	25.00	24.00	25.00	37.00	45.00	48.00		18.00	0.00	0.00
HARDNESS TOTAL	MG/L	45.00	44.00	43.00	54.00	63.00	64.00		84.00	66.00	43.00
IRON DISSOLVED	UG/L	230.00	410.00	240.00	220.00	300.00	260.00				
IRON TOTAL	UG/L	280.00*	430.00*	270.00*	330.00*	320.00*	390.00*				630.00*
MAGNESIUM DISS	MG/L	2.40	2.30	2.50	2.70	3.10	2.90				2.00
MANGANESE TOTAL	UG/L	1100.00*	1100.00*	1100.00*	1200.00*	2900.00*	1500.00*				490.00*
NITR. NO2 AS N TOTAL	MG/L	0.01	0.02	0.02	0.02	0.01	0.01				
NITR. NO3 AS N TOTAL	MG/L	9.80	11.00	9.50	9.50	9.50	9.00				
NITROGEN NH4 ASN TOT	MG/L	3.60	3.30	3.20	3.00	2.70	2.50	2.17			
NITROGEN NO2 ASN DIS	MG/L	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.00	0.01	0.04
NITROGEN NO3 ASN DIS	MG/L	9.80	10.00	9.00	9.70	8.00	2.20	9.00	1.00	23.00	4.50
NITROGEN TOT AS N	MG/L	13.00	14.00	13.00	12.00	12.00	11.00				
NITROGEN TOT ORG N	MG/L	0.00	0.00	0.40	0.00	0.00	0.00	1.19			0.88
NITROGEN TOTKJD AS N	MG/L	3.10	2.90	3.60	2.10	2.60	2.30	3.36			
NO2 + NO3 AS N TOT	MG/L	9.80	11.00*	9.50	9.50	9.50	9.00				
NO2+NO3 AS N DISS	MG/L	9.80	10.00	9.00	9.70	8.00	2.20				
OXYGEN DISSOLVED	MG/L	1.50	4.80	1.80	5.50	2.20	1.20				
PH FIELD		5.80	6.30	5.50	5.70	5.65	5.70		6.00	6.10	6.70
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.01	0.01	0.00	0.01	0.01	0.01				
PHOSPHORUS TOT AS P	MG/L	0.01	0.01	0.01	0.01	0.01	0.01	0.05			0.05
POTASSIUM DISS	MG/L	6.10	5.90	6.00	6.20	5.60	5.40				12.00
RESIDUE DIS CALC SUM	MG/L	177.00	166.00	158.00	161.00	164.00	145.00				236.00
SILICA DISSOLVED	MG/L	8.10	8.10	8.60	8.70	9.00	9.00				13.00
SODIUM DISS	MG/L	27.00	25.00	22.00	20.00	18.00	19.00				26.00
SP. CONDUCTANCE FLD		295.00	260.00	233.00	235.00	280.00	325.00		280.00	725.00	422.00
SULFATE DISS	MG/L	33.00	32.00	35.00	37.00	39.00	43.00			39.00	39.00
WATER TEMP (DEG C)		11.00	12.00	13.00	14.00	14.00	15.00			10.00	
DEPTH TO WATER	FT	12.75	13.38	13.70	14.60	14.17	15.23				

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 1251 741113	N 1251 75 318	N 1251 7510 8	N 1251 7511 4	N 1251 7512 3	N 1251 76 1 7	N 1251 76 213	N 1251 76 3 2	N 1251 76 4 7	N 1251 76 5 4
ALK, TOT (AS CACO3)	MG/L	29.00	90.00	27.00	22.00	23.00	18.00	18.00	22.00	36.00	44.00
BICARBONATE	MG/L	35.00	110.00	33.00	27.00	28.00	22.00	22.00	27.00	44.00	54.00
CALCIUM DISS	MG/L	20.00	39.00	15.00	10.00	13.00	12.00	11.00	13.00	11.00	18.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	24.00	35.00	30.00	13.00	10.00	8.90	10.00	11.00	17.00	10.00
DETERGENTS (MBAS)	MG/L	0.30	0.16	0.00	0.10	0.10	0.10	0.10	0.10	0.10	0.10
FLUORIDE DISS	MG/L	0.20	0.10	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00
HARDNESS NONCARB	MG/L	34.00	37.00	18.00	6.00	16.00	18.00	18.00	19.00	0.00	14.00
HARDNESS TOTAL	MG/L	63.00	130.00	45.00	28.00	39.00	36.00	36.00	42.00	35.00	59.00
IRON DISSOLVED	UG/L				400.00	230.00	30.00	60.00	40.00	90.00	50.00
IRON TOTAL	UG/L	480.00*	460.00*	330.00*	860.00*	2500.00*	150.00*	140.00*	210.00*	180.00*	370.00*
MAGNESIUM DISS	MG/L	3.10	7.20	1.80	0.70	1.50	1.50	2.00	2.20	1.90	3.30
MANGANESE TOTAL	UG/L	250.00*	1100.00*	320.00*	100.00*	110.00*	10.00*	50.00*	30.00*	10.00*	10.00*
NITR. NO2 AS N TOTAL	MG/L	0.01		0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00
NITR. NO3 AS N TOTAL	MG/L	2.70		2.20	4.60	4.80	3.60	4.40	4.60	3.60	5.30
NITROGEN NH4 ASN TOT	MG/L	3.10	15.60	0.04	0.02	0.03	0.03	0.01	0.14	0.01	0.03
NITROGEN NO2 ASN DIS	MG/L	0.01	0.05	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01
NITROGEN NO3 ASN DIS	MG/L	2.70	12.60	2.20	4.60	4.90	3.60	4.40	4.50	3.70	4.50
NITROGEN TOT AS N	MG/L	5.70		2.50	4.80	5.00	3.80	4.60	4.80	3.80	5.50
NITROGEN TOT ORG N	MG/L	0.00	1.20	0.27	0.22	0.14	0.20	0.18	0.01	0.19	0.20
NITROGEN TOTKJD AS N	MG/L	3.00	16.80	0.31	0.24	0.17	0.23	0.19	0.15	0.20	0.23
NO2 + NO3 AS N TOT	MG/L	2.70		2.20	4.60	4.80	3.60	4.40	4.60	3.60	5.30
NO2+NO3 AS N DISS	MG/L	2.70		2.20	4.60	4.90	3.60	4.40	4.50	3.70	4.50
OXYGEN DISSOLVED	MG/L	1.70	0.22	0.80	1.20	2.20	1.30	1.90	3.50	3.70	2.60
PH FIELD		6.10	6.80	5.40	5.80	6.10	5.80	5.80	5.70	5.90	6.00
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.00		0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01
PHOSPHORUS TOT AS P	MG/L	0.01	0.00	0.01	0.01	0.02	0.01	0.02	0.03	0.01	0.01
POTASSIUM DISS	MG/L	8.60	6.90	2.40	2.10	1.90	2.20	2.10	2.40	2.30	1.60
RESIDUE DIS CALC SUM	MG/L	198.00	261.00	171.00	138.00	137.00	120.00	125.00	131.00	174.00	139.00
SILICA DISSOLVED	MG/L	12.00	8.20	11.00	9.80	9.60	9.30	9.20	9.20	9.60	9.60
SODIUM DISS	MG/L	32.00	28.00	35.00	28.00	24.00	20.00	21.00	22.00	39.00	21.00
SP. CONDUCTANCE FLD		360.00	540.00	325.00	245.00	224.00	215.00	182.00	200.00	269.00	200.00
SULFATE DISS	MG/L	69.00	82.00	50.00	40.00	41.00	39.00	39.00	38.00	55.00	29.00
WATER TEMP (DEG C)		16.00	11.50	17.50	17.50	16.00	13.50	12.00	11.00	11.00	11.00
DEPTH TO WATER	FT	11.50	9.00	9.10	9.30	9.00	8.07	8.10	7.90	8.53	9.36

CONSTITUENT		N 1251	N 1251	N 1251	N 1251	N 1252	N 1252	N 1252	N 1252	N 1252	N 1252
		76 6 3	76 7 2	76 811	76 9 8	6612 8	741114	75 318	75 724	75 9 4	7510 8
ALK, TOT (AS CACO3)	MG/L	39.00	36.00	34.00	33.00	18.00	57.00	21.00	43.00	48.00	44.00
BICARBONATE	MG/L	48.00	44.00	41.00	40.00	22.00	70.00	25.00	52.00	59.00	54.00
CALCIUM DISS	MG/L	20.00	16.00	19.00	18.00		22.00	32.00	14.00	16.00	21.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	15.00	8.20	17.00	13.00	18.00	30.00	98.00	25.00	19.00	23.00
DETERGENTS (MBAS)	MG/L	0.10	0.10	0.10	0.10	0.08	0.40	0.12	0.15	0.20	0.10
FLUORIDE DISS	MG/L	0.10	0.10	0.00	0.00		0.10	0.20	0.10	0.10	0.10
HARDNESS NONCARB	MG/L	24.00	11.00	26.00	21.00	46.00	20.00	87.00	4.00	5.00	29.00
HARDNESS TOTAL	MG/L	64.00	47.00	60.00	54.00	64.00	77.00	110.00	47.00	54.00	73.00
IRON DISSOLVED	UG/L	80.00	170.00	170.00	170.00						
IRON TOTAL	UG/L	190.00*	320.00*	220.00*	420.00*		3300.00*	500.00*	190.00*	790.00*	1800.00*
MAGNESIUM DISS	MG/L	3.30	1.80	3.00	2.20		5.40	6.60	2.90	3.30	5.00
MANGANESE TOTAL	UG/L	7.00*	10.00*	20.00*	70.00*		380.00*	250.00*	7400.00*	140.00*	190.00*
NITR. NO2 AS N TOTAL	MG/L	0.01	0.01	0.01	0.01		0.00			0.00	0.01
NITR. NO3 AS N TOTAL	MG/L	4.30	3.40	4.50	5.60		0.57			5.30	6.00
NITROGEN NH4 ASN TOT	MG/L	0.01	0.02	0.03	0.05		1.00	1.10	1.20	1.50	1.80
NITROGEN NO2 ASN DIS	MG/L	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.01
NITROGEN NO3 ASN DIS	MG/L	3.80	4.10	3.50	2.50	7.20	0.58	2.20	< 0.10	5.60	6.60
NITROGEN TOT AS N	MG/L	4.50	3.70	4.70	5.70		2.00			7.00	8.00
NITROGEN TOT ORG N	MG/L	0.22	0.28	0.20	0.00		0.40	0.60	1.30	0.20	0.20
NITROGEN TOTKJD AS N	MG/L	0.23	0.30	0.23	0.05		1.40	1.68	2.50	1.70	2.00
NO2 + NO3 AS N TOT	MG/L	4.30	3.40	4.50	5.60		0.57			5.30	6.00
NO2+NO3 AS N DISS	MG/L	3.80	4.10	3.50	2.50		0.58			5.60	6.60
OXYGEN DISSOLVED	MG/L	2.70	3.30	2.80	1.60		1.00	0.30	2.80	5.70	0.70
PH FIELD		5.70	5.90	5.80	5.80	5.80	6.23	6.90	6.65	6.65	6.90
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.00	0.01	0.01	0.01		0.01			0.01	0.01
PHOSPHORUS TOT AS P	MG/L	0.01	0.01	0.01	0.03		0.01	0.00	0.25	0.01	0.01
POTASSIUM DISS	MG/L	2.10	2.10	2.80	3.70		4.10	5.30	4.80	5.00	5.50
RESIDUE DIS CALC SUM	MG/L	140.00	125.00	152.00	153.00		175.00	217.00	131.00	165.00	177.00
SILICA DISSOLVED	MG/L	11.00	11.00	12.00	12.00		4.20	3.20	4.00	4.20	3.80
SODIUM DISS	MG/L	19.00	20.00	22.00	26.00		28.00	33.00	27.00	29.00	24.00
SP. CONDUCTANCE FLD		188.00	115.00	245.00	270.00	255.00	350.00	375.00	295.00	280.00	330.00
SULFATE DISS	MG/L	29.00	26.00	40.00	47.00		44.00	26.00	28.00	34.00	39.00
WATER TEMP (DEG C)		13.00	14.00	16.50	17.00		16.00	12.00	16.50	22.00	16.00
DEPTH TO WATER	FT	9.11	10.10	9.00	9.78			4.90	4.80		

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 1252 7511 4	N 1252 7512 3	N 1252 76 1 7	N 1252 76 2 5	N 1252 76 3 2	N 1252 76 4 7	N 1252 76 5 4	N 1252 76 6 3	N 1252 76 7 2	N 1252 76 811
ALK, TOT (AS CACO3)	MG/L	47.00	48.00	38.00	22.00	24.00	31.00	33.00	38.00	43.00	40.00
BICARBONATE	MG/L	57.00	58.00	46.00	27.00	29.00	38.00	40.00	46.00	52.00	49.00
CALCIUM DISS	MG/L	23.00	22.00	18.00	22.00	20.00	13.00	10.00	10.00	7.60	12.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	25.00	19.00	19.00	56.00	52.00	23.00	11.00	17.00	11.00	17.00
DETERGENTS (MBAS)	MG/L	0.20	0.10	0.10	0.00	0.10	0.20	0.10	0.10	0.10	0.10
FLUORIDE DISS	MG/L	0.00	0.10	0.10	0.00	0.10	0.00	0.00	0.00	0.10	0.00
HARDNESS NONCARB	MG/L	27.00	23.00	20.00	49.00	41.00	10.00	0.00	0.00	0.00	0.00
HARDNESS TOTAL	MG/L	74.00	70.00	58.00	71.00	65.00	41.00	31.00	32.00	21.00	39.00
IRON DISSOLVED	UG/L	660.00	500.00	480.00	470.00	490.00	260.00	670.00	570.00	800.00	980.00
IRON TOTAL	UG/L	790.00*	590.00*	550.00*	600.00*	540.00*	8600.00*	780.00*	780.00*	1100.00*	1300.00*
MAGNESIUM DISS	MG/L	3.90	3.70	3.20	4.00	3.70	2.10	1.50	1.60	0.60	2.10
MANGANESE TOTAL	UG/L	190.00*	180.00*	20.00*	280.00*	340.00*	330.00*	210.00*	240.00*	260.00*	350.00*
NITR. NO2 AS N TOTAL	MG/L	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01
NITR. NO3 AS N TOTAL	MG/L	5.80	4.60	2.50	2.10	1.40	0.22	0.06	0.73	0.63	1.90
NITROGEN NH4 ASN TOT	MG/L	1.80	1.60	1.50	1.50	1.40	1.20	1.20	1.20	1.10	0.88
NITROGEN NO2 ASN DIS	MG/L	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01
NITROGEN NO3 ASN DIS	MG/L	5.80	4.30	2.50	2.00	1.40	0.27	0.05	0.54	0.56	1.30
NITROGEN TOT AS N	MG/L	7.70	6.40	4.00	3.80	2.90	3.60	1.40	2.20	2.20	3.00
NITROGEN TOT ORG N	MG/L	0.10	0.20	0.00	0.20	0.10	2.20	0.10	0.30	0.50	0.22
NITROGEN TOTKJD AS N	MG/L	1.90	1.80	1.50	1.70	1.50	3.40	1.30	1.50	1.60	1.10
NO2 + NO3 AS N TOT	MG/L	5.80	4.60	2.50	2.10	1.40	0.23	0.06	0.74	0.64	1.90
NO2+NO3 AS N DISS	MG/L	5.80	4.30	2.50	2.00	1.40	0.28	0.06	0.55	0.57	1.30
OXYGEN DISSOLVED	MG/L	1.60	0.80	2.40	1.70	0.80	0.40	0.30	4.00	3.30	1.60
PH FIELD		6.10	6.90	6.80	6.70	6.90	7.20	7.10	6.80	7.00	6.80
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01
PHOSPHORUS TOT AS P	MG/L	0.01	0.01	0.02	0.01	0.02	0.33	0.01	0.02	0.01	0.01
POTASSIUM DISS	MG/L	5.40	4.20	3.70	3.80	4.30	3.70	3.10	3.40	3.40	3.00
RESIDUE DIS CALC SUM	MG/L	172.00	150.00	123.00	148.00	142.00	123.00	99.00	109.00	94.00	96.00
SILICA DISSOLVED	MG/L	4.20	4.10	3.70	3.40	3.60	3.80	3.70	4.10	4.50	4.70
SODIUM DISS	MG/L	22.00	18.00	15.00	17.00	19.00	22.00	20.00	23.00	20.00	17.00
SP. CONDUCTANCE FLD		315.00	292.00	275.00	285.00	265.00	210.00	160.00	120.00	155.00	182.00
SULFATE DISS	MG/L	34.00	31.00	26.00	19.00	18.00	35.00	29.00	24.00	18.00	9.00
WATER TEMP (DEG C)		17.00	15.00	13.00	11.50	11.00	11.00	11.50	13.00	14.00	15.00
DEPTH TO WATER	FT	5.70	5.40	4.40	4.00	3.90	4.49	5.00	6.51	7.35	6.80

CONSTITUENT		N 1252	N 1252	N 1253	N 1253	N 1253	N 1253	N 1253	N 1253	N 1253	N 1253
		76 9 8	7612 2	6612 8	70 5 4	711012	72 512	741114	75 219	75 318	75 422
ALK, TOT (AS CACO3)	MG/L	39.00	32.00	60.00		134.00	207.00	94.00		128.00	
BICARBONATE	MG/L	48.00	39.00	73.00		163.00	252.00	114.00		156.00	
CALCIUM DISS	MG/L	12.00	17.00				15.00	26.00		21.00	
CARBONATE	MG/L	0.00	0.00				0.00	0.00		0.00	
CHLORIDE DISS	MG/L	12.00	27.00	18.00	52.00	85.00	54.00	76.00		68.00	
DETERGENTS (MBAS)	MG/L	0.10	0.07	0.41	0.77	1.40	1.98	0.33	0.17	0.31	0.33
FLUORIDE DISS	MG/L	0.00	0.10				0.00	0.10		0.20	
HARDNESS NONCARB	MG/L	0.00	21.00	2.00		0.00	0.00	0.00		0.00	
HARDNESS TOTAL	MG/L	38.00	53.00	62.00	50.00	66.00	52.00	87.00		69.00	
IRON DISSOLVED	UG/L	940.00	660.00								
IRON TOTAL	UG/L	1000.00*	880.00*				340.00*	180.00*		130.00*	
MAGNESIUM DISS	MG/L	1.90	2.50				3.50	5.40		4.00	
MANGANESE TOTAL	UG/L	340.00*	620.00*				4900.00*	8000.00*		7600.00*	
NITR. NO2 AS N TOTAL	MG/L	0.01						0.00			
NITR. NO3 AS N TOTAL	MG/L	1.30						0.01			
NITROGEN NH4 ASN TOT	MG/L	0.73	1.60					14.00	9.90	7.80	5.70
NITROGEN NO2 ASN DIS	MG/L	0.01	0.01	0.01		0.00	0.01	0.00	0.01	0.02 <	0.01
NITROGEN NO3 ASN DIS	MG/L	0.55	1.20	3.80		0.00	0.02	0.05	0.10 <	0.10	0.10
NITROGEN TOT AS N	MG/L	2.10						13.00			
NITROGEN TOT ORG N	MG/L	0.02	0.90				2.00	0.00	0.50	0.90	2.10
NITROGEN TOTKJD AS N	MG/L	0.75	2.50					13.00	10.40	8.68	7.80
NO2 + NO3 AS N TOT	MG/L	1.30						0.01			
NO2+NO3 AS N DISS	MG/L	0.56	1.20					0.05			
OXYGEN DISSOLVED	MG/L	2.90	0.40					0.40		0.40	
PH FIELD		6.90	7.30	6.10	6.60	6.60	6.90	6.70		5.60	
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.02						0.01			
PHOSPHORUS TOT AS P	MG/L	0.02	0.03				0.03	0.09	0.00	0.00	0.40
POTASSIUM DISS	MG/L	2.60	2.80				10.00	7.20		5.80	
RESIDUE DIS CALC SUM	MG/L	83.00	104.00				344.00	263.00		277.00	
SILICA DISSOLVED	MG/L	4.70	4.60				8.30	10.00		12.00	
SODIUM DISS	MG/L	13.00	13.00				75.00	47.00		57.00	
SP. CONDUCTANCE FLD		175.00	215.00	325.00	355.00	490.00	653.00	550.00		385.00	
SULFATE DISS	MG/L	10.00	12.00			34.00	28.00	35.00		32.00	
WATER TEMP (DEG C)		17.00	14.50			13.00	12.00	13.50		11.50	
DEPTH TO WATER	FT	6.73	6.75								

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 1253	N 1253	N 1253	N 1253	N 1253	N 1253	N 1253	N 1253	N 1253	N 1253
		75 521	75 624	75 724	75 9 4	76 2 5	75 9 4	7510 8	7511 4	7512 3	76 1 7
ALK, TOT (AS CACO3)	MG/L			126.00	126.00	137.00		124.00	126.00	128.00	151.00
BICARBONATE	MG/L			153.00	154.00	167.00		151.00	154.00	156.00	184.00
CALCIUM DISS	MG/L			21.00		21.00	21.00	21.00	22.00	25.00	25.00
CARBONATE	MG/L			0.00	0.00	0.00		0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L			59.00		110.00	65.00	69.00	85.00	130.00	120.00
DETERGENTS (MBAS)	MG/L	0.33	0.39	0.26		0.50	0.50	0.30	0.50	0.40	0.50
FLUORIDE DISS	MG/L			0.10		0.10	0.20	0.00	0.00	0.10	0.00
HARDNESS NONCARB	MG/L			0.00		0.00	0.00	0.00	0.00	0.00	0.00
HARDNESS TOTAL	MG/L			72.00		68.00	71.00	73.00	74.00	80.00	79.00
IRON DISSOLVED	UG/L					80.00			100.00	80.00	140.00
IRON TOTAL	UG/L			700.00*		150.00*	120.00*	160.00*	160.00*	120.00*	280.00*
MAGNESIUM DISS	MG/L			4.70		3.70	4.50	4.90	4.70	4.30	4.10
MANGANESE TOTAL	UG/L			130.00*		5300.00*	6800.00*	7100.00*	7100.00*	7100.00*	670.00*
NITR. NO2 AS N TOTAL	MG/L					0.07	0.00	0.00	0.01	0.01	0.00
NITR. NO3 AS N TOTAL	MG/L					0.05	0.03	0.01	0.01	0.00	0.01
NITROGEN NH4 ASN TOT	MG/L	5.00	4.70	3.30		11.00	1.90	4.80	6.10	11.00	12.00
NITROGEN NO2 ASN DIS	MG/L	< 0.01	< 0.01	< 0.01		0.00	0.08	0.00	0.01	0.01	0.00
NITROGEN NO3 ASN DIS	MG/L	0.18	0.10	< 0.10		0.01	0.00	0.01	0.01	0.02	0.01
NITROGEN TOT AS N	MG/L				3.70	11.00		4.50	6.60	10.00	13.00
NITROGEN TOT ORG N	MG/L	2.00	1.50	0.90		0.00	1.80	0.00	0.50	0.00	1.00
NITROGEN TOTKJD AS N	MG/L	7.00	6.20	4.20		11.00	3.70	4.50	6.60	10.00	13.00
NO2 + NO3 AS N TOT	MG/L					0.12	0.03	0.01	0.02	0.01	0.01
NO2+NO3 AS N DISS	MG/L					0.01	0.05	0.01	0.02	0.03	0.01
OXYGEN DISSOLVED	MG/L			0.85	3.10	1.50		1.50	2.00	2.50	3.30
PH FIELD				6.20	6.35	6.50		6.40	6.55	6.70	6.20
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L					0.01	0.01	0.00	0.00	0.01	0.01
PHOSPHORUS TOT AS P	MG/L	0.33	0.40	0.25		0.02	0.05	0.01	0.01	0.02	0.02
POTASSIUM DISS	MG/L			4.70		8.10	4.50	5.10	5.60	7.40	9.30
RESIDUE DIS CALC SUM	MG/L			257.00		352.00	270.00	271.00	299.00	363.00	375.00
SILICA DISSOLVED	MG/L			12.00		10.00	13.00	11.00	12.00	11.00	10.00
SODIUM DISS	MG/L			56.00		90.00	61.00	62.00	70.00	84.00	92.00
SP. CONDUCTANCE FLD				525.00	535.00	580.00		525.00	575.00	765.00	790.00
SULFATE DISS	MG/L			24.00		27.00	25.00	24.00	24.00	24.00	24.00
WATER TEMP (DEG C)				15.00	17.00	12.00		13.00	14.00	13.00	12.50
DEPTH TO WATER	FT					11.70			12.65	12.40	13.05

CONSTITUENT		N 1253	N 1253	N 1253	N 1253	N 1253	N 1253	N 1253	N 1254	N 1254	N 1254
		76 3 2	76 4 7	76 5 4	76 6 3	76 7 2	76 811	76 9 8	6612 8	70 5 4	741114
ALK, TOT (AS CACO3)	MG/L	123.00	135.00	130.00	93.00	130.00	95.00	103.00	60.00		43.00
BICARBONATE	MG/L	150.00	164.00	159.00	113.00	159.00	116.00	125.00	73.00		52.00
CALCIUM DISS	MG/L	20.00	20.00	21.00	17.00	16.00	17.00	25.00			30.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00
CHLORIDE DISS	MG/L	120.00	84.00	78.00	92.00	49.00	40.00	45.00	24.00	30.00	30.00
DETERGENTS (MBAS)	MG/L	0.30	0.50	0.50	0.30	0.30	0.10	0.20	1.30	0.47	0.20
FLUORIDE DISS	MG/L	0.20	0.00	0.00	0.00	0.10	0.00	0.00			0.10
HARDNESS NONCARB	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.00		50.00
HARDNESS TOTAL	MG/L	65.00	66.00	69.00	57.00	52.00	58.00	84.00	74.00	66.00	93.00
IRON DISSOLVED	UG/L	50.00	90.00	40.00	70.00	90.00	100.00	100.00			
IRON TOTAL	UG/L	130.00*	180.00*	70.00*	110.00*	160.00*	220.00*	100.00*			310.00*
MAGNESIUM DISS	MG/L	3.60	3.80	4.10	3.60	3.00	3.80	5.30			44.00
MANGANESE TOTAL	UG/L	5600.00*	4900.00*	4300.00*	6500.00*	6200.00*	*16000.*	*11000.*			2200.00*
NITR. NO2 AS N TOTAL	MG/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01			0.00
NITR. NO3 AS N TOTAL	MG/L	0.04	0.01	0.00	0.22	0.09	0.45	2.60			4.00
NITROGEN NH4 ASN TOT	MG/L	8.00	9.50	10.00	18.00	5.20	12.00	11.00			4.40
NITROGEN NO2 ASN DIS	MG/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		0.00
NITROGEN NO3 ASN DIS	MG/L	0.04	0.00	0.04	0.16	0.26	0.39	2.10	6.40	7.50	4.00
NITROGEN TOT AS N	MG/L	9.10	6.90	11.00	17.00	35.00	11.00	14.00			8.10
NITROGEN TOT ORG N	MG/L	1.00	0.00	1.00	0.00	30.00	0.00	0.00			0.00
NITROGEN TOTKJD AS N	MG/L	9.00	6.90	11.00	17.00	35.00	11.00	11.00			4.10
NO2 + NO3 AS N TOT	MG/L	0.05	0.02	0.01	0.23	0.10	0.46	2.60			4.00
NO2+NO3 AS N DISS	MG/L	0.05	0.00	0.05	0.17	0.27	0.40	2.10			4.00
OXYGEN DISSOLVED	MG/L	1.10	0.50	0.40	2.40	2.20	1.50	2.20			4.00
PH FIELD		6.40	6.50	6.50	6.50	6.60	6.50	6.60	6.20	6.60	6.20
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.01	0.00	0.01	0.01	0.00	0.01	0.01			0.01
PHOSPHORUS TOT AS P	MG/L	0.02	0.01	0.02	0.01	0.11	0.02	0.01			6.20
POTASSIUM DISS	MG/L	7.40	7.30	7.70	11.00	8.10	6.70	7.10			197.00
RESIDUE DIS CALC SUM	MG/L	347.00	307.00	291.00	278.00	260.00	197.00	222.00			11.00
SILICA DISSOLVED	MG/L	11.00	10.00	10.00	9.30	10.00	10.00	12.00			20.00
SODIUM DISS	MG/L	83.00	72.00	65.00	64.00	60.00	28.00	25.00			305.00
SP. CONDUCTANCE FLD		610.00	590.00	560.00	525.00	435.00	338.00	440.00	370.00	300.00	52.00
SULFATE DISS	MG/L	28.00	29.00	27.00	25.00	34.00	32.00	32.00			13.50
WATER TEMP (DEG C)		11.00	11.00	11.00	12.00	13.00	14.00	14.00			9.20
DEPTH TO WATER	FT	11.80	11.81	12.38	16.78	14.73	15.30	14.20			9.23

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 1254 75 318	N 1254 75 729	N 1254 75 9 4	N 1254 7510 8	N 1254 7511 4	N 1254 7512 3	N 1254 76 1 7	N 1254 76 2 5	N 1254 76 3 2	N 1254 76 4 7
ALK, TOT (AS CACO3)	MG/L	59.00	42.00	54.00	41.00	42.00	28.00	27.00	23.00	23.00	25.00
BICARBONATE	MG/L	72.00	51.00	66.00	50.00	51.00	34.00	33.00	28.00	28.00	30.00
CALCIUM DISS	MG/L	33.00	29.00	25.00	24.00	23.00	21.00	23.00	18.00	17.00	22.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00
CHLORIDE DISS	MG/L	36.00	32.00	32.00	33.00	30.00	37.00	34.00	34.00	31.00	33.00
DETERGENTS (MBAS)	MG/L	0.13	0.19	0.30	0.20	0.20	0.20	0.20	0.20	0.30	0.20
FLUORIDE DISS	MG/L	0.10	0.00	0.10	0.00	0.00	0.10	0.10	0.30	0.10	0.00
HARDNESS NONCARB	MG/L	45.00	53.00	28.00	40.00	35.00	40.00	45.00	37.00	35.00	51.00
HARDNESS TOTAL	MG/L	100.00	95.00	82.00	81.00	76.00	68.00	72.00	60.00	58.00	76.00
IRON DISSOLVED	UG/L					210.00	270.00	100.00	360.00	160.00	200.00
IRON TOTAL	UG/L	590.00*	170.00*	340.00*	1200.00*	470.00*	400.00*	320.00*	400.00*	210.00*	380.00*
MAGNESIUM DISS	MG/L	5.20	5.50	4.80	5.00	4.60	3.70	3.50	3.70	3.70	5.10
MANGANESE TOTAL	UG/L	3100.00*	3900.00*	4700.00*	3500.00*	3100.00*	3100.00*	410.00*	3900.00*	3700.00*	3500.00*
NITR. NO2 AS N TOTAL	MG/L			0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
NITR. NO3 AS N TOTAL	MG/L			10.00	8.50	5.30	4.60	5.80	6.40	5.20	4.80
NITROGEN NH4 ASN TOT	MG/L	2.10	1.80	2.20	5.40	4.50	2.20	2.50	2.00	2.20	1.60
NITROGEN NO2 ASN DIS	MG/L	0.01	< 0.01	0.04	0.01	0.01	0.03	0.01	0.01	0.01	0.01
NITROGEN NO3 ASN DIS	MG/L	2.20	8.00	10.00	8.60	5.30	4.20	5.60	6.00	4.80	6.30
NITROGEN TOT AS N	MG/L			27.00	14.00	10.00	7.00	8.20	8.30	8.00	6.60
NITROGEN TOT ORG N	MG/L	0.70	3.80	15.00	0.20	0.20	0.20	0.00	0.00	0.60	0.20
NITROGEN TOTKJD AS N	MG/L	2.80	5.60	17.00	5.60	4.70	2.40	2.40	1.90	2.80	1.80
NO2 + NO3 AS N TOT	MG/L			10.00*	8.50	5.30	4.60	5.80	6.40	5.20	4.80
NO2+NO3 AS N DISS	MG/L			10.00	8.60	5.30	4.20	5.60	6.00	4.80	6.30
OXYGEN DISSOLVED	MG/L	0.60	6.20		1.50	1.60	1.20	1.20	2.10	1.20	2.40
PH FIELD		6.40	6.10	6.40	6.50	5.85	6.70	6.40	6.10	6.50	6.80
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L			0.01	0.00	0.00	0.05	0.01	0.00	0.00	0.01
PHOSPHORUS TOT AS P	MG/L	0.00	0.32	0.05	0.01	0.01	0.08	0.03	0.01	0.01	0.01
POTASSIUM DISS	MG/L	4.80	4.60	5.50	6.20	5.80	3.20	3.20	2.50	2.70	5.60
RESIDUE DIS CALC SUM	MG/L	205.00	187.00	232.00	212.00	191.00	174.00	175.00	165.00	150.00	194.00
SILICA DISSOLVED	MG/L	12.00	12.00	11.00	8.60	8.90	11.00	11.00	11.00	10.00	11.00
SODIUM DISS	MG/L	20.00	26.00	28.00	25.00	22.00	23.00	21.00	20.00	18.00	21.00
SP. CONDUCTANCE FLD		255.00	405.00	375.00	380.00	375.00	310.00	320.00	270.00	255.00	308.00
SULFATE DISS	MG/L	58.00	53.00	49.00	47.00	48.00	39.00	38.00	35.00	32.00	53.00
WATER TEMP (DEG C)		11.00	14.00	19.00	13.00	14.50	13.00	12.00	11.00	11.00	10.00
DEPTH TO WATER	FT					11.48	9.50	9.50	8.60	9.30	12.00

CONSTITUENT		N 1254	N 1254	N 1254	N 1254	N 1254	N 1254	N 1263	N 1263	N 1263	N 1263
		76 5 4	76 6 3	76 7 2	76 811	76 9 8	7612 2	68 227	70 5 5	741119	75 326
ALK, TOT (AS CACO3)	MG/L	23.00	30.00	30.00	35.00	29.00	20.00	5.00		0.00	0.00
BICARBONATE	MG/L	28.00	36.00	37.00	43.00	35.00	24.00	6.00		0.00	0.00
CALCIUM DISS	MG/L	24.00	25.00	23.00	26.00	27.00	26.00			16.00	14.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00
CHLORIDE DISS	MG/L	32.00	32.00	30.00	34.00	35.00	44.00	17.00	18.00	21.00	22.00
DETERGENTS (MBAS)	MG/L	0.20	0.20	0.20	0.20	0.30	0.13	0.19	0.15	0.24	0.14
FLUORIDE DISS	MG/L	0.00	0.00	0.10	0.00	0.00	0.00			0.50	0.50
HARDNESS NONCARB	MG/L	55.00	51.00	46.00	49.00	60.00	67.00	59.00		49.00	43.00
HARDNESS TOTAL	MG/L	78.00	81.00	76.00	84.00	89.00	86.00	64.00	64.00	49.00	43.00
IRON DISSOLVED	UG/L	150.00	190.00	240.00	250.00	240.00	320.00				
IRON TOTAL	UG/L	300.00*	360.00*	370.00*	1100.00*	400.00*	1200.00*			220.00*	210.00*
MAGNESIUM DISS	MG/L	4.30	4.50	4.50	4.70	5.20	5.20			2.20	2.00
MANGANESE TOTAL	UG/L	1500.00*	1500.00*	1700.00*	3200.00*	2100.00*	1800.00*			750.00*	670.00*
NITR. NO2 AS N TOTAL	MG/L	0.01	0.01	0.01	0.01	0.01				0.00	
NITR. NO3 AS N TOTAL	MG/L	7.20	4.70	4.00	5.30	3.60				13.00	
NITROGEN NH4 ASN TOT	MG/L	2.50	1.90	1.60	2.10	2.90	2.30			0.56	0.20
NITROGEN NO2 ASN DIS	MG/L	0.01	0.01	0.01	0.01	0.01	0.01	0.00		0.00	< 0.01
NITROGEN NO3 ASN DIS	MG/L	7.00	2.90	4.10	3.40	2.50	4.40	14.00	14.00	13.00	9.00
NITROGEN TOT AS N	MG/L	9.60	6.90	6.20	7.00	6.30				13.00	
NITROGEN TOT ORG N	MG/L	0.00	0.30	0.60	0.00	0.00	1.30			0.00	1.20
NITROGEN TOTKJD AS N	MG/L	2.40	2.20	2.20	1.70	2.70	3.60			0.44	1.40
NO2 + NO3 AS N TOT	MG/L	7.20	4.70	4.00	5.30	3.60				13.00*	
NO2+NO3 AS N DISS	MG/L	7.00	2.90	4.10	3.40	2.50	4.40			13.00	
OXYGEN DISSOLVED	MG/L	3.20	1.50	4.60	7.50	4.00	6.50			0.40	0.60
PH FIELD		6.50	5.90	5.90	5.90	6.00	6.50	5.10	5.30	5.30	5.09
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.00	0.01	0.00	0.01	0.01				0.01	
PHOSPHORUS TOT AS P	MG/L	0.01	0.01	0.02	0.01	0.01	0.04			0.01	0.16
POTASSIUM DISS	MG/L	4.50	3.60	3.80	4.20	5.80	5.90			6.80	5.50
RESIDUE DIS CALC SUM	MG/L	206.00	187.00	197.00	202.00	227.00	206.00			182.00	121.00
SILICA DISSOLVED	MG/L	7.60	8.20	8.60	9.50	11.00	11.00			14.00	15.00
SODIUM DISS	MG/L	27.00	25.00	30.00	27.00	28.00	24.00			24.00	22.00
SP. CONDUCTANCE FLD		325.00	288.00	285.00	315.00	390.00	405.00	315.00	295.00	310.00	265.00
SULFATE DISS	MG/L	62.00	58.00	60.00	60.00	86.00	58.00			40.00	39.00
WATER TEMP (DEG C)		11.00	11.50	12.00	14.50	14.50	14.00	12.00		14.00	12.00
DEPTH TO WATER	FT	12.17	10.67	10.25	10.15	10.65	9.81				15.10

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 1263	N 1263	N 1263	N 1263	N 1263	N 7397	N 7397	N 7397	N 7397	N 7397
		75 729	76 1 8	76 317	76 629	76 913	75 320	75 716	75 821	75 9 9	751023
ALK, TOT (AS CACO3)	MG/L	0.00	2.00	0.00	2.00	11.00	12.00	10.00	3.00	2.00	5.00
BICARBONATE	MG/L	0.00	2.00	0.00	3.00	13.00	15.00	12.00	4.00	3.00	6.00
CALCIUM DISS	MG/L	16.00	13.00	15.00	15.00	15.00	4.60	23.00	3.50	3.00	5.40
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	20.00	29.00	28.00	27.00	29.00	11.00	12.00	8.10	8.50	12.00
DETERGENTS (MBAS)	MG/L	0.14	0.22	0.22	0.20	0.20	0.03		0.00	0.00	0.00
FLUORIDE DISS	MG/L	0.40	0.50	0.40	0.30	0.30	0.00	0.00	0.10	0.10	0.00
HARDNESS NONCARB	MG/L	49.00	39.00	47.00	45.00	36.00	5.00	57.00	14.00	9.00	16.00
HARDNESS TOTAL	MG/L	49.00	41.00	47.00	47.00	47.00	17.00	67.00	17.00	12.00	21.00
IRON DISSOLVED	UG/L			90.00	150.00	200.00					
IRON TOTAL	UG/L	230.00*	250.00*	220.00*	230.00*	380.00*	3800.00*	3700.00*	3300.00*	2300.00*	2300.00*
MAGNESIUM DISS	MG/L	2.20	2.10	2.30	2.40	2.30	1.40	2.40	2.00	1.00	1.90
MANGANESE TOTAL	UG/L	730.00*	820.00*	950.00*	1200.00*	1200.00*	90.00*	60.00*	50.00*	50.00*	60.00*
NITR. NO2 AS N TOTAL	MG/L				0.04				0.26	0.00	0.00
NITR. NO3 AS N TOTAL	MG/L				14.00				2.80	3.30	3.10
NITROGEN NH4 ASN TOT	MG/L	0.14	0.00	0.14	0.60	0.00	0.00		0.03	0.05	0.10
NITROGEN NO2 ASN DIS	MG/L	0.03	< 0.01	< 0.01	0.03	0.01	< 0.01		0.00	0.01	0.00
NITROGEN NO3 ASN DIS	MG/L	11.80	21.00	16.00	14.00	15.40	3.60		2.80	3.20	3.10
NITROGEN TOT AS N	MG/L				15.00				3.30	3.40	3.50
NITROGEN TOT ORG N	MG/L	1.30	0.28	0.70	0.22	0.00	0.56		0.14	0.09	0.26
NITROGEN TOTKJD AS N	MG/L	1.40	0.28	0.84	0.82	0.00	0.56		0.17	0.14	0.36
NO2 + NO3 AS N TOT	MG/L				14.00*				3.10	3.30	3.10
NO2+NO3 AS N DISS	MG/L				14.00				2.80	3.20	3.10
OXYGEN DISSOLVED	MG/L	0.50	2.90	0.80	1.40	0.90	0.45	8.10	8.80		7.10
PH FIELD		4.55	4.50	4.70	4.70	4.80	5.25	8.50	5.60	5.20	5.40
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L				0.01				0.01	0.02	0.01
PHOSPHORUS TOT AS P	MG/L	0.39	0.14	0.02	0.01	0.01	< 0.10		0.01	0.01	0.01
POTASSIUM DISS	MG/L	5.50	6.30	6.20	7.00	6.80	1.00	0.70	1.20	1.00	1.00
RESIDUE DIS CALC SUM	MG/L	115.00	137.00	140.00	210.00	162.00	37.00	54.00	31.00	30.00	48.00
SILICA DISSOLVED	MG/L	14.00	15.00	16.00	16.00	16.00	5.20	4.00	5.30	5.50	5.50
SODIUM DISS	MG/L	23.00	31.00	31.00	30.00	31.00	6.50	5.00	5.20	5.00	5.10
SP. CONDUCTANCE FLD		320.00	460.00	310.00	280.00	375.00	90.00	108.00	75.00	77.00	80.00
SULFATE DISS	MG/L	34.00	39.00	40.00	49.00	55.00	0.20	0.70	0.40	0.40	0.80
WATER TEMP (DEG C)		17.00	14.00	12.50	13.50	15.50	12.00	12.00	11.00	12.00	17.80
DEPTH TO WATER	FT	13.20	16.50	13.09	15.48	15.72		82.20		81.63	81.60

CONSTITUENT		N 7397 751112	N 7397 751211	N 7397 76 116	N 7397 76 210	N 7397 76 312	N 7397 76 4 8	N 7397 76 510	N 7397 76 6 8	N 7397 76 7 8	N 7397 76 8 2
ALK, TOT (AS CACO3)	MG/L	4.00	5.00	4.00	5.00	5.00	3.00	10.00	12.00	11.00	11.00
BICARBONATE	MG/L	5.00	6.00	5.00	6.00	6.00	4.00	12.00	15.00	14.00	13.00
CALCIUM DISS	MG/L	3.90	5.40	22.00	3.00	2.50	2.30	3.80	2.60	3.50	3.60
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	10.00	9.60	10.00	10.00	11.00	9.90	8.60	8.20	12.00	10.00
DETERGENTS (MBAS)	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10
FLUORIDE DISS	MG/L	0.00	0.00	0.20	0.00	0.10	0.00	0.00	0.00	0.10	0.00
HARDNESS NONCARB	MG/L	12.00	19.00	60.00	11.00	11.00	12.00	10.00	4.00	9.00	10.00
HARDNESS TOTAL	MG/L	16.00	24.00	64.00	16.00	16.00	15.00	20.00	16.00	20.00	21.00
IRON DISSOLVED	UG/L	1000.00	830.00	860.00	1200.00	890.00	640.00	960.00	930.00	790.00	810.00
IRON TOTAL	UG/L	4800.00*	3200.00*	1100.00*	1800.00*	1300.00*	970.00*	2300.00*	1700.00*	950.00*	760.00*
MAGNESIUM DISS	MG/L	1.50	2.60	2.30	2.10	2.30	2.30	2.50	2.30	2.80	2.90
MANGANESE TOTAL	UG/L	80.00*	60.00*	40.00*	60.00*	40.00*	40.00*	60.00*	40.00*	40.00*	40.00*
NITR. NO2 AS N TOTAL	MG/L	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.01
NITR. NO3 AS N TOTAL	MG/L	3.30	3.30	3.60	3.30	3.60	3.80	3.70	3.70	4.30	4.90
NITROGEN NH4 ASN TOT	MG/L	0.07	0.07	0.01	0.12	0.07	0.05	0.08	0.08	0.05	0.04
NITROGEN NO2 ASN DIS	MG/L	0.01	0.01	0.01	0.06	0.01	0.01	0.01	0.01	0.01	0.01
NITROGEN NO3 ASN DIS	MG/L	3.30	3.40	4.00	2.90	3.60	3.80	3.90	3.40	4.30	4.80
NITROGEN TOT AS N	MG/L	3.50	3.50	3.70	3.40	3.70	4.00	4.00	3.80	4.30	5.10
NITROGEN TOT ORG N	MG/L	0.11	0.11	0.05	0.00	0.06	0.10	0.17	0.05	0.00	0.11
NITROGEN TOTKJD AS N	MG/L	0.18	0.18	0.06	0.12	0.13	0.15	0.25	0.13	0.00	0.15
NO2 + NO3 AS N TOT	MG/L	3.30	3.30	3.60	3.30	3.60	3.80	3.70	3.70	4.30	4.90
NO2+NO3 AS N DISS	MG/L	3.30	3.40	4.00	3.00	3.60	3.80	3.90	3.40	4.30	4.80
OXYGEN DISSOLVED	MG/L										
PH FIELD		5.30	5.40	5.30	5.50	5.60	5.40	5.30	5.40	5.50	5.70
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01
PHOSPHORUS TOT AS P	MG/L	0.02	0.06	0.02	0.02	0.01	0.01	0.02	0.01	0.02	0.01
POTASSIUM DISS	MG/L	1.10	1.10	1.00	0.80	0.90	0.90	0.80	0.90	1.10	1.10
RESIDUE DIS CALC SUM	MG/L	46.00	50.00	67.00	44.00	48.00	46.00	51.00	49.00	59.00	58.00
SILICA DISSOLVED	MG/L	5.40	5.60	5.30	5.30	5.50	5.40	5.40	5.50	5.70	5.90
SODIUM DISS	MG/L	5.20	5.50	5.00	4.90	5.30	5.50	5.30	5.30	5.90	6.00
SP. CONDUCTANCE FLD		90.00	100.00	75.00	55.00	50.00	60.00	50.00	50.00	60.00	95.00
SULFATE DISS	MG/L	0.50	0.90	0.60	0.70	1.00	0.40	0.10	1.20	1.10	0.00
WATER TEMP (DEG C)		12.00	10.50	10.50	11.00	7.00	10.00	12.00	12.00	13.00	12.00
DEPTH TO WATER	FT	80.60	80.05	78.10	78.90	78.64	78.25	79.03	79.07	79.69	80.13

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 7397	N 7397	N 7450	N 7450	N 8235	N 8235	N 8235	N 8235	N 8235	N 8235
		76 9 1	7612 2	76 621	76 915	661213	67 130	67 627	671215	68 119	75 7 9
ALK, TOT (AS CACO3)	MG/L	10.00	8.00	16.00	16.00	14.00	16.00	16.00	21.00	21.00	25.00
BICARBONATE	MG/L	12.00	10.00	19.00	20.00	17.00	19.00	20.00	26.00	26.00	30.00
CALCIUM DISS	MG/L	3.40	3.80	13.00	12.00		21.00	18.00			30.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00						0.00
CHLORIDE DISS	MG/L	10.00	13.00	8.40	8.00	22.00	22.00	23.00	22.00	23.00	51.00
DETERGENTS (MBAS)	MG/L	0.10	0.03	0.10	0.03	0.67	0.80	0.80	0.77	0.69	0.10
FLUORIDE DISS	MG/L	0.00	0.00	0.10	0.10		0.10	0.10			0.00
HARDNESS NONCARB	MG/L	10.00	14.00	37.00	33.00	54.00	54.00	44.00	41.00	43.00	73.00
HARDNESS TOTAL	MG/L	20.00	22.00	53.00	49.00	68.00	70.00	61.00	62.00	64.00	98.00
IRON DISSOLVED	UG/L	960.00	660.00	1600.00	1100.00						
IRON TOTAL	UG/L	1400.00*	830.00*	1700.00*	1300.00*						380.00*
MAGNESIUM DISS	MG/L	2.80	3.00	5.00	4.70		4.10	3.90			5.50
MANGANESE TOTAL	UG/L	50.00*	40.00*	200.00*	160.00*						0.00
NITR. NO2 AS N TOTAL	MG/L	0.01		0.01							0.00
NITR. NO3 AS N TOTAL	MG/L	4.50		6.70							3.90
NITROGEN NH4 ASN TOT	MG/L	0.09	0.00	0.06	0.00						0.00
NITROGEN NO2 ASN DIS	MG/L	0.01	0.01	0.01	0.01	0.02					0.00
NITROGEN NO3 ASN DIS	MG/L	4.50	2.50	6.30	6.60	12.00	15.00	12.00	11.00	11.00	
NITROGEN TOT AS N	MG/L	4.60		6.70							3.90
NITROGEN TOT ORG N	MG/L	0.00	0.84	0.00	1.10						0.04
NITROGEN TOTKJD AS N	MG/L	0.05	0.84	0.00	1.10						0.04
NO2 + NO3 AS N TOT	MG/L	4.50		6.70							3.90
NO2+NO3 AS N DISS	MG/L	4.50	2.50	6.30							8.00
OXYGEN DISSOLVED	MG/L										4.40
PH FIELD		5.60	5.50	6.20	6.50	6.20	6.60	6.10	6.50	6.60	5.60
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.01		0.00							0.01
PHOSPHORUS TOT AS P	MG/L	0.01	0.04	0.03	< 0.01						0.01
POTASSIUM DISS	MG/L	1.10	1.20	1.20	1.00		4.80	5.70			3.50
RESIDUE DIS CALC SUM	MG/L	58.00	51.00	103.00	73.00		192.00	184.00			220.00
SILICA DISSOLVED	MG/L	5.70	5.80	12.00	12.00		11.00	11.00			7.30
SODIUM DISS	MG/L	5.80	6.80	5.70	6.40		24.00	26.00			31.00
SP. CONDUCTANCE FLD		87.00	100.00	135.00	175.00	300.00	299.00	303.00	325.00	330.00	389.00
SULFATE DISS	MG/L	2.70	0.70	19.00	18.00		28.00	31.00			41.00
WATER TEMP (DEG C)		13.00	11.00	13.00	13.00		12.00	14.00	13.00	13.00	17.00
DEPTH TO WATER	FT	80.30	80.23	97.31	97.72						

CONSTITUENT		N 8235	N 8235	N 8235	N 8235	N 8235	N 8235	N 8235	N 8235	N 8235	N 8235
		75 8 6	75 9 3	7510 9	7511 3	7512 1	76 113	76 2 4	76 3 1	76 4 5	76 5 5
ALK,TOT (AS CACO3)	MG/L	27.00	31.00	29.00	35.00	38.00	30.00	24.00	25.00	30.00	25.00
BICARBONATE	MG/L	33.00	38.00	35.00	43.00	46.00	36.00	29.00	31.00	36.00	31.00
CALCIUM DISS	MG/L	34.00	45.00	33.00	31.00	31.00	25.00	21.00	23.00	24.00	25.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
CHLORIDE DISS	MG/L	60.00	56.00	61.00	60.00	46.00	27.00	28.00	64.00	36.00	42.00
DETERGENTS (MBAS)	MG/L	0.10	0.10	0.10	0.20	0.10	0.10	0.10	0.10	0.10	0.10
FLUORIDE DISS	MG/L	0.00	0.10	0.00	0.10	0.00	0.00	0.20	0.00	0.00	0.10
HARDNESS NONCARB	MG/L	82.00	110.00	80.00	58.00	60.00	52.00	46.00	50.00	49.00	56.00
HARDNESS TOTAL	MG/L	110.00	140.00	110.00	93.00	98.00	82.00	69.00	75.00	78.00	81.00
IRON DISSOLVED	UG/L				190.00	200.00	70.00	60.00	70.00	100.00	90.00
IRON TOTAL	UG/L	90.00*	260.00*	220.00*	610.00*	1000.00*	360.00*	200.00*	200.00*	160.00*	150.00*
MAGNESIUM DISS	MG/L	5.90	6.40	6.40	3.80	5.00	4.70	4.10	4.30	4.40	4.50
MANGANESE TOTAL	UG/L	0.00	10.00*	20.00*	20.00*	0.00	0.00	0.00	10.00*	10.00*	0.00
NITR. NO2 AS N TOTAL	MG/L	0.00	0.00	0.01	0.00	0.01	0.00	0.04	0.00	0.00	0.01
NITR. NO3 AS N TOTAL	MG/L	8.50	8.90	9.80	7.90	6.50	7.80	6.70	5.30	5.40	4.70
NITROGEN NH4 ASN TOT	MG/L	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.02
NITROGEN NO2 ASN DIS	MG/L	0.04	0.04	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
NITROGEN NO3 ASN DIS	MG/L	7.90	8.90	8.00	8.10	5.80	7.20	6.70	2.30	5.50	4.30
NITROGEN TOT AS N	MG/L	8.50	9.00	10.00	8.00	6.60	7.90	6.90	5.50	5.50	4.80
NITROGEN TOT ORG N	MG/L	0.03	0.05	0.24	0.11	0.10	0.12	0.21	0.15	0.13	0.11
NITROGEN TOTKJD AS N	MG/L	0.04	0.05	0.24	0.11	0.12	0.12	0.22	0.15	0.13	0.13
NO2 + NO3 AS N TOT	MG/L	8.50	8.90	9.80	7.90	6.50	7.80	6.70	5.30	5.40	4.70
NO2+NO3 AS N DISS	MG/L	7.90	8.90	8.00	8.10	5.80	7.20	6.70	2.30	5.50	4.30
OXYGEN DISSOLVED	MG/L	4.50	5.50	2.60	2.30	3.60	4.30	3.00	4.50	5.10	3.70
PH FIELD		5.80	5.80	5.80	5.70	6.10	5.80		5.80	5.60	5.90
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00
PHOSPHORUS TOT AS P	MG/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01
POTASSIUM DISS	MG/L	3.40	3.30	3.70	3.60	2.50	2.10	2.10	2.90	2.40	2.50
RESIDUE DIS CALC SUM	MG/L	238.00	248.00	241.00	248.00	219.00	169.00	162.00	203.00	178.00	177.00
SILICA DISSOLVED	MG/L	7.30	7.10	7.10	6.50	6.50	6.40	6.90	7.20	7.40	6.90
SODIUM DISS	MG/L	36.00	32.00	33.00	40.00	34.00	20.00	20.00	41.00	25.00	25.00
SP. CONDUCTANCE FLD		448.00	405.00	445.00	427.00	396.00	320.00	250.00	265.00	290.00	305.00
SULFATE DISS	MG/L	40.00	40.00	44.00	46.00	45.00	34.00	36.00	35.00	37.00	37.00
WATER TEMP (DEG C)		18.00	19.00	17.00	16.00	15.50	14.00	12.00	12.00	12.00	13.00
DEPTH TO WATER	FT	14.90	15.35	15.80	15.40	16.60	15.10	14.30	14.00	14.03	14.48

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 8235	N 8235	N 8235	N 8235	N 8430	N 8430	N 8430	N 8598	N 8598	N 8598
		76 6 1	76 7 6	76 8 3	76 830	71 719	76 621	76 920	69 910	7011 6	75 711
ALK, TOT (AS CACO3)	MG/L	18.00	45.00	30.00	30.00	21.00	16.00	17.00		7.00	12.00
BICARBONATE	MG/L	22.00	55.00	37.00	37.00	25.00	20.00	21.00		9.00	15.00
CALCIUM DISS	MG/L	20.00	23.00	25.00	25.00	6.00	5.80	6.50			21.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00
CHLORIDE DISS	MG/L	38.00	27.00	54.00	68.00	5.40	5.80	4.90	27.00	36.00	35.00
DETERGENTS (MBAS)	MG/L	0.10	0.80	0.10	0.10	0.02	0.00	0.08	0.12	0.05	0.10
FLUORIDE DISS	MG/L	0.00	0.10	0.10	0.10	0.10	0.10	0.10			0.10
HARDNESS NONCARB	MG/L	47.00	29.00	56.00	57.00	3.00	5.00	6.00		91.00	56.00
HARDNESS TOTAL	MG/L	65.00	74.00	86.00	87.00	24.00	21.00	24.00	0.00	98.00	68.00
IRON DISSOLVED	UG/L	200.00	270.00	160.00	140.00		90.00	120.00			
IRON TOTAL	UG/L	580.00*	910.00*	250.00*	320.00*	460.00*	350.00*	1800.00*			230.00*
MAGNESIUM DISS	MG/L	3.70	4.00	5.80	6.00	2.10	1.70	1.80			3.80
MANGANESE TOTAL	UG/L	10.00*	4000.00*	0.00	0.00	0.00	10.00*	20.00*			0.00
NITR. NO2 AS N TOTAL	MG/L	0.01	0.01	0.01	0.00	0.00	0.01				0.01
NITR. NO3 AS N TOTAL	MG/L	6.40	10.00	4.60	3.90	0.80	1.10				6.00
NITROGEN NH4 ASN TOT	MG/L	0.01	3.10	0.01	0.01	0.15	0.01	0.00			0.00
NITROGEN NO2 ASN DIS	MG/L	0.01	0.00	0.01	0.01		0.01	< 0.01		0.00	0.01
NITROGEN NO3 ASN DIS	MG/L	6.40	10.00	4.50	3.50		0.93	1.20	9.70	8.60	6.10
NITROGEN TOT AS N	MG/L	6.40	14.00	5.00	4.00		1.10				6.10
NITROGEN TOT ORG N	MG/L	0.00	1.00	0.37	0.12	0.06	0.02	0.00			0.06
NITROGEN TOTKJD AS N	MG/L	0.00	4.10	0.38	0.13		0.03	0.00			0.06
NO2 + NO3 AS N TOT	MG/L	6.40	10.00*	4.60	3.90		1.10				6.00
NO2+NO3 AS N DISS	MG/L	6.40	10.00	4.50	3.50		0.94				6.10
OXYGEN DISSOLVED	MG/L	3.40	4.00	3.60	2.20						2.65
PH FIELD		5.80	5.70	5.80	5.70	7.10	6.40	6.80	6.60	5.40	5.50
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.01	0.01	0.01	0.01		0.00				0.01
PHOSPHORUS TOT AS P	MG/L	0.03	0.10	0.02	0.02	0.09	0.03	0.04			0.01
POTASSIUM DISS	MG/L	4.60	5.10	2.50	2.90	1.00	0.80	0.80			4.60
RESIDUE DIS CALC SUM	MG/L	178.00	227.00	201.00	224.00	51.00	59.00	56.00			170.00
SILICA DISSOLVED	MG/L	12.00	13.00	6.90	6.80	12.00	17.00	16.00			11.00
SODIUM DISS	MG/L	25.00	30.00	31.00	38.00	5.30	5.60	6.50			24.00
SP. CONDUCTANCE FLD		255.00	255.00	330.00	380.00	82.00	60.00	96.00		350.00	296.00
SULFATE DISS	MG/L	35.00	53.00	37.00	43.00	6.90	8.20	8.90	49.00	59.00	36.00
WATER TEMP (DEG C)		14.00	15.50	16.00	16.00	11.40	13.00	16.00			16.50
DEPTH TO WATER	FT	14.89	15.73	16.49	15.74		120.30	120.30			

CONSTITUENT		N 8598	N 8598	N 8598	N 8598	N 8598	N 8598	N 8598	N 8649	N 8649	N 8649
		75 8 6	75 9 3	7510 6	7511 3	7512 1	76 113	76 2 4	70 5 8	75 221	75 731
ALK, TOT (AS CACO3)	MG/L	12.00	17.00	14.00	16.00	16.00	14.00	11.00	44.00	12.00	7.00
BICARBONATE	MG/L	15.00	21.00	17.00	20.00	19.00	17.00	14.00	54.00	7.00	8.00
CALCIUM DISS	MG/L	21.00	21.00	23.00	21.00	23.00	19.00	19.00		2.70	1.10
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00		4.00	0.00
CHLORIDE DISS	MG/L	36.00	38.00	43.00	40.00	41.00	36.00	35.00	41.00	3.60	3.10
DETERGENTS (MBAS)	MG/L	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.12	0.00	
FLUORIDE DISS	MG/L	0.00	0.10	0.00	0.00	0.00	0.10	0.20		0.10	0.00
HARDNESS NONCARB	MG/L	56.00	52.00	60.00	46.00	57.00	48.00	52.00	0.00	0.00	0.00
HARDNESS TOTAL	MG/L	68.00	69.00	74.00	62.00	72.00	62.00	64.00	28.00	9.00	5.00
IRON DISSOLVED	UG/L				210.00	200.00	90.00	120.00		30.00	
IRON TOTAL	UG/L	260.00*	370.00*	510.00*	680.00*	410.00*	450.00*	310.00*		2200.00*	*12000.*
MAGNESIUM DISS	MG/L	3.80	4.00	3.90	2.30	3.60	3.50	4.00		0.50	0.60
MANGANESE TOTAL	UG/L	0.00	20.00*	20.00*	30.00*	10.00*	10.00*	10.00*		10.00*	160.00*
NITR. NO2 AS N TOTAL	MG/L	0.01	0.00	0.01	0.01	0.01	0.00	0.01		0.00	
NITR. NO3 AS N TOTAL	MG/L	6.00	6.50	6.60	6.40	7.40	7.00	7.30		0.00	
NITROGEN NH4 ASN TOT	MG/L	0.01	0.00	0.00	0.00	0.01	0.00	0.00		0.00	
NITROGEN NO2 ASN DIS	MG/L	0.04	0.04	0.01	0.01	0.01	0.01	0.02		0.01	
NITROGEN NO3 ASN DIS	MG/L	5.60	6.50	5.90	6.50	6.80	7.00	2.30		0.04	
NITROGEN TOT AS N	MG/L	6.10	6.60	6.80	6.50	7.50	7.10	7.40		0.05	
NITROGEN TOT ORG N	MG/L	0.12	0.09	0.16	0.06	0.08	0.09	0.06		0.05	
NITROGEN TOTKJD AS N	MG/L	0.13	0.09	0.16	0.06	0.09	0.09	0.06		0.05	
NO2 + NO3 AS N TOT	MG/L	6.00	6.50	6.60	6.40	7.40	7.00	7.30		0.00	
NO2+NO3 AS N DISS	MG/L	5.60	6.50	5.90	6.50	6.80	7.00	2.30		0.05	
OXYGEN DISSOLVED	MG/L	2.90	0.40	1.60	2.20	1.40	4.10	36.00		0.15	0.80
PH FIELD		5.50	5.50	5.50	5.40	5.60	5.30		7.70	10.00	6.35
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.01	0.01	0.00	0.01	0.00				0.00	
PHOSPHORUS TOT AS P	MG/L	0.01	0.01	0.01	0.01	0.01	0.02	0.01		0.01	
POTASSIUM DISS	MG/L	4.60	4.60	5.10	4.90	4.50	4.70	4.40		0.80	1.00
RESIDUE DIS CALC SUM	MG/L	169.00	177.00	184.00	181.00	187.00	174.00	15.30		19.00	17.00
SILICA DISSOLVED	MG/L	11.00	11.00	11.00	11.00	11.00	11.00	11.00		0.20	1.80
SODIUM DISS	MG/L	24.00	24.00	25.00	26.00	26.00	25.00	24.00		3.20	4.70
SP. CONDUCTANCE FLD		304.00	310.00	310.00	310.00	325.00	335.00	250.00	220.00	28.00	85.00
SULFATE DISS	MG/L	36.00	35.00	38.00	37.00	38.00	35.00	38.00	4.00	0.70	0.60
WATER TEMP (DEG C)		14.50	17.00	16.50	15.50	15.00	14.00	14.00		17.00	15.00
DEPTH TO WATER	FT	22.80	23.25		23.30	23.50		22.30			

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 8649 76 317	N 8649 76 416	N 8649 76 629	N 8649 76 913	N 8669 75 8 7	N 8669 75 9 2	N 8669 7510 8	N 8669 7511 3	N 8669 7512 3	N 8669 76 114
ALK, TOT (AS CACO3)	MG/L	203.00	191.00	157.00	72.00	17.00	21.00	23.00	31.00	31.00	28.00
BICARBONATE	MG/L	248.00	233.00	192.00	88.00	21.00	25.00	28.00	38.00	38.00	34.00
CALCIUM DISS	MG/L	54.00	47.00	36.00	21.00	19.00	20.00	21.00	23.00	23.00	18.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	470.00*	400.00*	280.00*	170.00	31.00	31.00	35.00	33.00	33.00	29.00
DETERGENTS (MBAS)	MG/L	0.44	1.00	0.20	0.30	0.10	0.10	0.10	0.10	0.10	0.10
FLUORIDE DISS	MG/L	0.20	0.20	0.20	0.30	0.00	0.10	0.00	0.10	0.00	0.00
HARDNESS NONCARB	MG/L	38.00	13.00	7.00	30.00	43.00	43.00	41.00	36.00	41.00	31.00
HARDNESS TOTAL	MG/L	240.00	200.00	160.00	100.00	60.00	63.00	64.00	67.00	72.00	59.00
IRON DISSOLVED	UG/L	1100.00	1400.00	610.00	530.00				720.00	640.00	230.00
IRON TOTAL	UG/L	1300.00*	1900.00*	740.00*	670.00*	1100.00*	1300.00*	1200.00*	1400.00*	4600.00*	670.00*
MAGNESIUM DISS	MG/L	26.00	21.00	18.00	12.00	3.00	3.20	2.90	2.40	3.50	3.40
MANGANESE TOTAL	UG/L	130.00*	110.00*	70.00*	40.00*	630.00*	670.00*	670.00*	490.00*	570.00*	530.00*
NITR. NO2 AS N TOTAL	MG/L		0.01	0.02		0.01	0.01	0.01	0.01	0.01	0.02
NITR. NO3 AS N TOTAL	MG/L		0.00	0.00		6.60	6.70	5.60	5.70	5.40	6.70
NITROGEN NH4 ASN TOT	MG/L	7.14	5.00	7.20	3.40	1.80	0.01	1.60	1.50	1.60	1.60
NITROGEN NO2 ASN DIS	MG/L	< 0.01	0.01	0.02	< 0.01	0.04	0.00	0.01	0.01	0.01	0.01
NITROGEN NO3 ASN DIS	MG/L	< 0.01	0.01	0.02	< 0.10	5.70	6.90	5.30	5.40	5.30	6.20
NITROGEN TOT AS N	MG/L		8.10	9.30		8.40	9.00	7.40	7.50	7.20	8.70
NITROGEN TOT ORG N	MG/L	4.62	3.10	2.10	1.10	0.00	2.30	0.20	0.30	0.20	0.40
NITROGEN TOTKJD AS N	MG/L	11.76	8.10	9.30	4.50	1.80	2.30	1.80	1.80	1.80	2.00
NO2 + NO3 AS N TOT	MG/L		0.01	0.02		6.60	6.70	5.60	5.70	5.40	6.70
NO2+NO3 AS N DISS	MG/L		0.02	0.04		5.70	6.90	5.30	5.40	5.30	6.20
OXYGEN DISSOLVED	MG/L	2.30	0.20	2.40	3.90	1.10	6.10	0.80	1.00	1.40	1.30
PH FIELD		6.50	6.70	6.70	6.60	5.65	5.60	5.70	5.80	5.95	5.90
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L		0.00	0.01		0.01	0.01	0.00	0.00	0.00	0.01
PHOSPHORUS TOT AS P	MG/L	0.14	0.03	0.01	0.10	0.01	0.01	0.01	0.01	0.01	0.01
POTASSIUM DISS	MG/L	8.50	15.00	14.00	8.90	4.60	4.80	4.80	4.60	4.20	4.30
RESIDUE DIS CALC SUM	MG/L	977.00	884.00	679.00	426.00	162.00	174.00	174.00	176.00	178.00	164.00
SILICA DISSOLVED	MG/L	23.00	21.00	20.00	20.00	7.80	7.90	5.90	6.70	7.10	6.80
SODIUM DISS	MG/L	250.00	240.00	180.00	110.00	25.00	25.00	26.00	26.00	25.00	24.00
SP. CONDUCTANCE FLD		1750.00	1550.00	1100.00	880.00	390.00	327.00	310.00	325.00	332.00	320.00
SULFATE DISS	MG/L	22.00	23.00	35.00	40.00	36.00	39.00	41.00	37.00	39.00	34.00
WATER TEMP (DEG C)		14.00	14.50	14.00	14.50	14.50	17.00	17.00	16.00	14.00	13.00
DEPTH TO WATER	FT	7.13	5.57	15.24	5.90	7.50	7.80	7.50	8.55	8.40	9.60

CONSTITUENT		N 8669	N 8669	N 8669	N 8669	N 8669	N 8669	N 8669	N 8669	N 8706	N 8706
		76 2 5	76 3 2	76 4 6	76 5 4	76 6 2	76 7 2	76 811	76 9 7	75 731	76 416
ALK, TOT (AS CACO3)	MG/L	24.00	26.00	29.00	26.00	28.00	18.00	16.00	16.00	7.00	13.00
BICARBONATE	MG/L	29.00	32.00	35.00	32.00	34.00	22.00	20.00	19.00	8.00	16.00
CALCIUM DISS	MG/L	20.00	19.00	20.00	19.00	22.00	20.00	17.00	16.00	1.10	1.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	26.00	32.00	45.00	42.00	38.00	28.00	18.00	14.00	3.10	4.10
DETERGENTS (MBAS)	MG/L	0.10	0.10	0.10	0.10	0.20	0.20	0.10	0.10	< 0.01	0.10
FLUORIDE DISS	MG/L	0.00	0.10	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00
HARDNESS NONCARB	MG/L	39.00	36.00	35.00	36.00	42.00	43.00	38.00	34.00	0.00	0.00
HARDNESS TOTAL	MG/L	63.00	63.00	64.00	62.00	70.00	61.00	54.00	50.00	5.00	11.00
IRON DISSOLVED	UG/L	230.00	220.00	450.00	200.00	140.00	250.00	180.00	250.00		7600.00
IRON TOTAL	UG/L	490.00*	450.00*	570.00*	980.00*	480.00*	470.00*	420.00*	2900.00*	*12000.*	*10000.*
MAGNESIUM DISS	MG/L	3.20	3.70	3.40	3.50	3.70	2.80	2.90	2.40	0.60	2.00
MANGANESE TOTAL	UG/L	690.00*	640.00*	650.00*	640.00*	450.00*	820.00*	720.00*	710.00*	160.00*	160.00*
NITR. NO2 AS N TOTAL	MG/L	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01		0.00
NITR. NO3 AS N TOTAL	MG/L	7.10	6.30	6.30	7.20	7.10	7.30	6.10	7.20		0.01
NITROGEN NH4 ASN TOT	MG/L	2.00	1.90	1.70	1.90	1.60	1.90	1.80	2.20	0.21	0.01
NITROGEN NO2 ASN DIS	MG/L	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	< 0.01	0.01
NITROGEN NO3 ASN DIS	MG/L	7.00	3.80	6.20	6.80	7.10	7.30	5.70	3.20	< 0.10	0.00
NITROGEN TOT AS N	MG/L	8.90	8.60	8.30	9.40	9.20	9.20	7.80	9.40		0.01
NITROGEN TOT ORG N	MG/L	0.00	0.40	0.30	0.30	0.50	0.00	0.00	0.00	1.20	0.00
NITROGEN TOTKJD AS N	MG/L	1.80	2.30	2.00	2.20	2.10	1.90	1.70	2.20	1.40	0.00
NO2 + NO3 AS N TOT	MG/L	7.10	6.30	6.30	7.20	7.10	7.30	6.10	7.20		0.01
NO2+NO3 AS N DISS	MG/L	7.00	3.80	6.20	6.80	7.10	7.30	5.70	3.20		0.00
OXYGEN DISSOLVED	MG/L	1.10	0.70	0.20	0.30	0.50	1.40	1.20	0.90	0.80	0.30
PH FIELD		5.80	5.90	6.00	5.90	5.70	5.60	5.70	5.80	6.35	6.90
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.01	0.01	0.00	0.00	0.01	0.02	0.01	0.01		0.01
PHOSPHORUS TOT AS P	MG/L	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.28	0.01
POTASSIUM DISS	MG/L	4.50	4.60	4.80	4.90	5.00	5.70	4.80	5.30	1.00	0.50
RESIDUE DIS CALC SUM	MG/L	157.00	159.00	193.00	189.00	190.00	181.00	149.00	129.00	0.02	28.00
SILICA DISSOLVED	MG/L	7.20	7.00	6.90	6.80	7.70	8.90	8.40	8.10	1.80	1.50
SODIUM DISS	MG/L	19.00	25.00	32.00	31.00	28.00	30.00	20.00	18.00	4.70	2.80
SP. CONDUCTANCE FLD		265.00	290.00	332.00	310.00	290.00	258.00	260.00	250.00	85.00	50.00
SULFATE DISS	MG/L	32.00	35.00	36.00	36.00	37.00	42.00	43.00	41.00	0.60	0.20
WATER TEMP (DEG C)		13.00	13.00	14.00	13.50	14.00	14.00	14.00	17.00	15.00	13.00
DEPTH TO WATER	FT	7.50	7.60	7.73	8.43	10.47	12.34	10.81	10.73		0.20

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 8789 75 325	N 8789 75 731	N 8789 75 9 2	N 8789 7510 8	N 8789 7511 4	N 8789 7512 3	N 8789 76 1 7	N 8789 76 2 5	N 8789 76 3 2	N 8789 76 4 6
ALK, TOT (AS CACO3)	MG/L	80.00	48.00	48.00	40.00	39.00	41.00	39.00	39.00	39.00	43.00
BICARBONATE	MG/L	98.00	58.00	59.00	49.00	47.00	50.00	47.00	47.00	48.00	52.00
CALCIUM DISS	MG/L	27.00	23.00	23.00	23.00	27.00	26.00	22.00	23.00	23.00	23.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	46.00	39.00	30.00	31.00	30.00	29.00	29.00	29.00	27.00	29.00
DETERGENTS (MBAS)	MG/L	0.23	0.19	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.30
FLUORIDE DISS	MG/L	0.10	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.20	0.00
HARDNESS NONCARB	MG/L	7.00	26.00	25.00	34.00	46.00	39.00	33.00	36.00	35.00	32.00
HARDNESS TOTAL	MG/L	88.00	74.00	74.00	74.00	85.00	80.00	71.00	75.00	74.00	75.00
IRON DISSOLVED	UG/L					250.00	540.00	120.00	300.00	170.00	190.00
IRON TOTAL	UG/L	850.00*	380.00*	1400.00*	780.00*	840.00*	6500.00*	3000.00*	3000.00*	680.00*	920.00*
MAGNESIUM DISS	MG/L	4.90	3.90	3.90	4.00	4.20	3.60	4.00	4.20	4.00	4.20
MANGANESE TOTAL	UG/L	6200.00*	7000.00*	5700.00*	5400.00*	5100.00*	5200.00*	570.00*	4800.00*	4500.00*	4600.00*
NITR. NO2 AS N TOTAL	MG/L			0.04	0.05	0.08	0.10	0.05	0.01	0.00	0.01
NITR. NO3 AS N TOTAL	MG/L			11.00	12.00	12.00	13.00	13.00	12.00	17.00	5.20
NITROGEN NH4 ASN TOT	MG/L	5.00	6.40	5.60	6.10	5.80	5.70	5.70	5.00	4.40	4.40
NITROGEN NO2 ASN DIS	MG/L	0.01	0.11	0.01	0.04	0.08	0.10	0.05	0.01	0.01	0.01
NITROGEN NO3 ASN DIS	MG/L	4.80	9.60	11.00	9.10	13.00	12.00	13.00	11.00	9.50	9.90
NITROGEN TOT AS N	MG/L			21.00	18.00	18.00	19.00	20.00	21.00	22.00	9.60
NITROGEN TOT ORG N	MG/L	0.60	1.70	4.40	0.30	0.10	0.10	0.90	3.70	0.20	0.00
NITROGEN TOTKJD AS N	MG/L	5.60	8.10	10.00	6.40	5.90	5.80	6.60	8.70	4.60	4.40
NO2 + NO3 AS N TOT	MG/L			11.00*	12.00*	12.00*	13.00*	13.00*	12.00*	17.00*	5.20
NO2+NO3 AS N DISS	MG/L			11.00	9.10	13.00	12.00	13.00	11.00	9.50	9.90
OXYGEN DISSOLVED	MG/L	0.40	0.55	6.80	0.80	1.10	3.50	1.60	1.40	0.80	0.20
PH FIELD		5.85	6.10	6.00	5.90	5.90	6.70	6.00	6.20	6.10	6.00
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L			0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01
PHOSPHORUS TOT AS P	MG/L	0.10	0.22	0.06	0.01	0.01	0.02	0.05	0.01	0.02	0.01
POTASSIUM DISS	MG/L	6.90	6.90	5.70	6.20	6.30	5.80	6.40	5.50	5.20	5.10
RESIDUE DIS CALC SUM	MG/L	239.00	217.00	238.00	221.00	241.00	231.00	229.00	225.00	180.00	222.00
SILICA DISSOLVED	MG/L	9.30	10.00	10.00	10.00	11.00	11.00	10.00	9.80	9.80	10.00
SODIUM DISS	MG/L	39.00	42.00	34.00	31.00	31.00	30.00	28.00	28.00	28.00	29.00
SP. CONDUCTANCE FLD		435.00	490.00	446.00	350.00	410.00	425.00	445.00	370.00	360.00	361.00
SULFATE DISS	MG/L	58.00	64.00	53.00	51.00	51.00	47.00	49.00	53.00	50.00	52.00
WATER TEMP (DEG C)		13.50	13.00	16.00	15.00	14.50	13.50	13.00	12.00	15.50	11.00
DEPTH TO WATER	FT	12.70	11.20	11.20	11.80	11.95	11.60	11.30	10.70	11.10	11.13

CONSTITUENT		N 8789	N 8789	N 8789	N 8789	N 8789	N 8848	N 8848	N 8848	N 8848	N 8848
		76 5 4	76 6 2	76 7 2	76 811	76 830	75 319	75 729	76 1 6	76 315	76 625
ALK, TOT (AS CACO3)	MG/L	47.00	49.00	33.00	47.00	43.00		62.00	43.00	46.00	34.00
BICARBONATE	MG/L	57.00	60.00	40.00	57.00	52.00		75.00	52.00	56.00	42.00
CALCIUM DISS	MG/L	23.00	23.00	21.00	23.00	24.00		25.00	19.00	26.00	19.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	29.00	30.00	32.00	31.00	30.00		22.00	11.00	11.00	8.80
DETERGENTS (MBAS)	MG/L	0.60	0.70	0.10	0.50	0.50	0.60		0.41	0.55	0.30
FLUORIDE DISS	MG/L	0.10	0.00	0.10	0.00	0.10		0.00	0.00	0.00	0.00
HARDNESS NONCARB	MG/L	27.00	26.00	38.00	29.00	36.00		15.00	19.00	35.00	25.00
HARDNESS TOTAL	MG/L	74.00	76.00	71.00	76.00	79.00		76.00	61.00	81.00	60.00
IRON DISSOLVED	UG/L	140.00	120.00	320.00	230.00	150.00				50.00	90.00
IRON TOTAL	UG/L	440.00*	5000.00*	550.00*	630.00*	520.00*		70.00*	320.00*	110.00*	140.00*
MAGNESIUM DISS	MG/L	3.90	4.40	4.40	4.40	4.60		3.40	3.40	3.80	3.00
MANGANESE TOTAL	UG/L	4700.00*	4500.00*	10.00*	7100.00*	3400.00*		1500.00*	3800.00*	2600.00*	8500.00*
NITR. NO2 AS N TOTAL	MG/L	0.01	0.01	0.01	0.01	0.01					0.02
NITR. NO3 AS N TOTAL	MG/L	9.80	9.70	3.70	9.90	10.00					0.01
NITROGEN NH4 ASN TOT	MG/L	3.90	3.90	0.02	3.70	3.90			2.50	0.00	4.50
NITROGEN NO2 ASN DIS	MG/L	0.01	0.01	0.00	0.01	0.01	< 0.01	<	0.01	< 0.01	0.03
NITROGEN NO3 ASN DIS	MG/L	9.80	10.00	3.60	5.30	9.60	1.80		0.30	0.50	0.03
NITROGEN TOT AS N	MG/L	14.00	14.00	4.20	14.00	14.00					4.40
NITROGEN TOT ORG N	MG/L	0.20	0.20	0.46	0.00	0.00	0.59		1.10	2.24	0.00
NITROGEN TOTKJD AS N	MG/L	4.10	4.10	0.48	3.60	3.70	0.56		3.60	2.24	4.40
NO2 + NO3 AS N TOT	MG/L	9.80	9.70	3.70	9.90	10.00*					0.03
NO2+NO3 AS N DISS	MG/L	9.80	10.00	3.60	5.30	9.60					0.06
OXYGEN DISSOLVED	MG/L	0.40	3.50	2.30	2.40	0.10		0.90	0.70	1.00	1.40
PH FIELD		6.00	5.80	5.80	5.80	5.70		6.10	6.90	6.50	6.10
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.01	0.01	0.01	0.01	0.01					0.01
PHOSPHORUS TOT AS P	MG/L	0.01	0.02	0.01	0.03	0.02	< 0.10		0.12	0.15	0.01
POTASSIUM DISS	MG/L	5.10	4.90	2.30	4.90	5.00		3.60	2.90	2.00	3.90
RESIDUE DIS CALC SUM	MG/L	227.00	231.00	172.00	215.00	228.00		179.00	138.00	145.00	154.00
SILICA DISSOLVED	MG/L	11.00	12.00	6.70	13.00	13.00		13.00	11.00	11.00	12.00
SODIUM DISS	MG/L	30.00	31.00	30.00	32.00	32.00		31.00	13.00	11.00	11.00
SP. CONDUCTANCE FLD		360.00	340.00	330.00	385.00	373.00		285.00	265.00	210.00	375.00
SULFATE DISS	MG/L	53.00	52.00	40.00	55.00	51.00		44.00	52.00	53.00	75.00
WATER TEMP (DEG C)		12.00	12.50	13.00	13.00	13.00		14.00	9.00	8.00	13.00
DEPTH TO WATER	FT	11.61	9.92	12.98	12.47	12.37			1.10	2.27	2.79

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 8848	N 8863	N 8863	N 8863	N 8863	N 8863	N 8863	N 8863	N 8873	N 8888
		76 910	75 325	75 730	751229	76 315	76 415	76 625	76 910	75 326	75 220
ALK, TOT (AS CACO3)	MG/L	32.00	7.00	5.00	11.00	5.00	11.00	13.00	11.00	33.00	11.00
BICARBONATE	MG/L	39.00	9.00	6.00	14.00	6.00	14.00	16.00	14.00	10.00	13.00
CALCIUM DISS	MG/L	10.00	1.00	1.10	1.80	1.00	0.60	0.90	0.80	2.00	19.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00
CHLORIDE DISS	MG/L	4.90	3.60	2.60	3.10	3.80	3.90	3.30	3.10	6.80	23.00
DETERGENTS (MBAS)	MG/L	< 0.10	< 0.01	< 0.01	0.02	0.12	0.00	0.10	0.01	0.03	0.20
FLUORIDE DISS	MG/L	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.10
HARDNESS NONCARB	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.00
HARDNESS TOTAL	MG/L	31.00	5.00	5.00	8.00	5.00	5.00	6.00	5.00	5.00	62.00
IRON DISSOLVED	UG/L	90.00				1900.00	1200.00	1500.00	1500.00		170.00
IRON TOTAL	UG/L	340.00*	1900.00*	1600.00*	340.00*	2200.00*	1600.00*	1500.00*	1500.00*	4300.00*	1000.00*
MAGNESIUM DISS	MG/L	1.40	0.60	0.60	0.90	0.70	0.80	0.80	0.80	0.10	3.60
MANGANESE TOTAL	UG/L	2900.00*	20.00*	20.00*	40.00*	20.00*	20.00*	20.00*	20.00*	60.00*	1300.00*
NITR. NO2 AS N TOTAL	MG/L						0.01	0.02			0.01
NITR. NO3 AS N TOTAL	MG/L						0.00	0.04			13.00
NITROGEN NH4 ASN TOT	MG/L	0.70	0.00 E	0.00	0.14	0.00	0.04	0.09	0.00	0.20	0.06
NITROGEN NO2 ASN DIS	MG/L <	0.01	0.02 <	0.01 <	0.01 <	0.01	0.01	0.02 <	0.01 <	0.01	0.03
NITROGEN NO3 ASN DIS	MG/L <	0.01	0.20	0.10	0.50	0.20	0.00	0.05	0.10	0.80	11.00
NITROGEN TOT AS N	MG/L						0.06	0.06			13.00
NITROGEN TOT ORG N	MG/L	1.00 E	0.84 E	2.20 E	0.70	5.04	0.01	0.00	1.40	1.20	0.05
NITROGEN TOTKJD AS N	MG/L	1.70	0.84 E	2.20	0.84	5.04	0.05	0.00	1.40	1.40	0.11
NO2 + NO3 AS N TOT	MG/L						0.01	0.06			13.00*
NO2+NO3 AS N DISS	MG/L						0.01	0.07			11.00
OXYGEN DISSOLVED	MG/L	0.90	1.30	0.80		0.70	0.60	0.40	0.70	0.30	8.20
PH FIELD		6.60	5.35	7.00	6.80	5.95	5.80	6.00	6.30	10.40	5.55
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L						0.00	0.01			0.00
PHOSPHORUS TOT AS P	MG/L <	0.01	0.18 E	0.22	0.25	0.20	0.01	0.01	0.03	0.30	0.01
POTASSIUM DISS	MG/L	1.20	0.90	0.60	0.50	0.40	0.40	0.40	0.40	0.50	9.40
RESIDUE DIS CALC SUM	MG/L	77.00	24.00	21.00	23.00	24.00	27.00	31.00	26.00	46.00	214.00
SILICA DISSOLVED	MG/L	9.70	8.00	7.80	6.50	7.80	7.70	8.00	7.80	0.40	17.00
SODIUM DISS	MG/L	5.60	3.20	3.80	2.70	2.40	2.80	2.80	2.70	15.00	29.00
SP. CONDUCTANCE FLD		138.00		50.00		20.00	10.00	38.00	35.00	110.00	330.00
SULFATE DISS	MG/L	25.00	2.10	1.50	0.50	3.40	2.90	5.00	1.80	1.00	58.00
WATER TEMP (DEG C)		16.00	12.50	15.00	13.00	12.00	12.00	12.50	12.00	13.50	13.00
DEPTH TO WATER	FT	2.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.55	

CONSTITUENT		N 8888	N 8888	N 8888	N 8888	N 8888	N 8888	N 8888	N 8888	N 8888	N 8888
		75 820	751023	751211	76 120	76 218	76 315	76 4 8	76 510	76 6 7	76 714
ALK, TOT (AS CACO3)	MG/L	11.00	16.00	13.00	9.00	11.00	8.00	11.00	11.00	14.00	14.00
BICARBONATE	MG/L	13.00	19.00	16.00	11.00	14.00	10.00	14.00	13.00	17.00	17.00
CALCIUM DISS	MG/L	27.00	27.00	28.00	25.00	21.00	21.00	20.00	20.00	20.00	20.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	29.00	37.00	34.00	32.00	29.00	28.00	27.00	24.00	23.00	27.00
DETERGENTS (MBAS)	MG/L	0.20	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
FLUORIDE DISS	MG/L	0.00	0.00	0.10	0.20	0.10	0.10	0.00	0.10	0.00	0.00
HARDNESS NONCARB	MG/L	79.00	79.00	81.00	74.00	60.00	63.00	57.00	59.00	55.00	53.00
HARDNESS TOTAL	MG/L	90.00	94.00	94.00	83.00	71.00	71.00	69.00	69.00	69.00	67.00
IRON DISSOLVED	UG/L			330.00	150.00	200.00	150.00	260.00	260.00	260.00	290.00
IRON TOTAL	UG/L	1600.00*	2300.00*	8300.00*	1500.00*	1100.00*	690.00*	1100.00*	3000.00*	2200.00*	1200.00*
MAGNESIUM DISS	MG/L	5.50	6.50	5.80	5.00	4.60	4.50	4.60	4.70	4.60	4.10
MANGANESE TOTAL	UG/L	1500.00*	1700.00*	1300.00*	960.00*	870.00*	690.00*	700.00*	650.00*	560.00*	580.00*
NITR. NO2 AS N TOTAL	MG/L	0.02	0.03	0.02	0.01	0.01	0.02	0.01	0.01	0.04	0.01
NITR. NO3 AS N TOTAL	MG/L	11.00	9.70	9.90	9.60	10.00	8.50	9.10	8.20	8.00	8.20
NITROGEN NH4 ASN TOT	MG/L	0.03	0.03	0.01	0.02	0.04	0.02	0.06	0.03	0.09	0.04
NITROGEN NO2 ASN DIS	MG/L	0.02	0.04	0.02	0.01	0.01	0.01	0.01	0.01	0.04	0.02
NITROGEN NO3 ASN DIS	MG/L	11.00	10.00	9.70	< 2.40	10.00	8.20	8.80	8.30	7.90	7.50
NITROGEN TOT AS N	MG/L	11.00	10.00	10.00	9.70	10.00	8.70	9.10	8.20	8.20	8.20
NITROGEN TOT ORG N	MG/L	0.10	0.49	0.13	0.04	0.15	0.13	0.00	0.00	0.11	0.00
NITROGEN TOTKJD AS N	MG/L	0.13	0.52	0.14	0.06	0.19	0.15	0.00	0.00	0.20	0.00
NO2 + NO3 AS N TOT	MG/L	11.00*	9.70	9.90	9.60	10.00*	8.50	9.10	8.20	8.00	8.20
NO2+NO3 AS N DISS	MG/L	11.00	10.00	9.70	< 2.40	10.00	8.20	8.80	8.30	7.90	7.50
OXYGEN DISSOLVED	MG/L	8.40	6.70								
PH FIELD		5.60	5.80	5.60	5.90	5.40	5.50	5.70	5.50	5.80	5.70
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.00	0.07	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00
PHOSPHORUS TOT AS P	MG/L	0.09	0.01	0.04	0.02	0.02	0.01	0.01	0.01	0.01	0.01
POTASSIUM DISS	MG/L	8.10	8.20	7.80	7.60	6.70	6.90	6.40	6.40	6.40	6.80
RESIDUE DIS CALC SUM	MG/L	218.00	227.00	227.00	177.00	203.00	192.00	192.00	184.00	186.00	187.00
SILICA DISSOLVED	MG/L	16.00	16.00	16.00	15.00	15.00	15.00	15.00	14.00	15.00	15.00
SODIUM DISS	MG/L	21.00	21.00	23.00	23.00	23.00	23.00	23.00	22.00	23.00	23.00
SP. CONDUCTANCE FLD		340.00	350.00	380.00	290.00	310.00	297.00	285.00	230.00	245.00	300.00
SULFATE DISS	MG/L	56.00	58.00	61.00	53.00	52.00	52.00	50.00	49.00	50.00	49.00
WATER TEMP (DEG C)		13.00	14.50	12.00	11.00	10.00	11.00	12.00	13.00	13.00	13.00
DEPTH TO WATER	FT			86.11	85.70	84.90	84.35	83.99	84.10	84.18	84.80

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 8889	N 8888	N 8984	N 8984	N 8984	N 8984	N 9057	N 9057	N 9057	N 9057
		76 812	76 9 7	76 128	76 319	76 622	76 913	75 211	75 716	76 128	76 319
ALK, TOT (AS CACO3)	MG/L	13.00	12.00	23.00	20.00	18.00	18.00	16.00	7.00	11.00	13.00
BICARBONATE	MG/L	16.00	15.00	28.00	24.00	22.00	22.00	19.00	8.00	14.00	16.00
CALCIUM DISS	MG/L	20.00	21.00	12.00	13.00	8.50	18.00	24.00	32.00	25.00	26.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00
CHLORIDE DISS	MG/L	27.00	28.00	29.00	24.00	17.00	54.00	31.00	29.00	28.00	29.00
DETERGENTS (MBAS)	MG/L	0.10	0.10	0.10	0.19	0.00	0.07	0.20	0.14	0.20	0.22
FLUORIDE DISS	MG/L	0.00	0.00	0.10	0.00	0.10	0.10	0.00	0.00	0.10	0.00
HARDNESS NONCARB	MG/L	54.00	58.00	19.00	26.00	11.00	49.00	65.00	91.00	72.00	72.00
HARDNESS TOTAL	MG/L	67.00	71.00	42.00	46.00	29.00	67.00	81.00	97.00	83.00	86.00
IRON DISSOLVED	UG/L	260.00	220.00	1800.00	650.00	1300.00	4400.00			270.00	350.00
IRON TOTAL	UG/L	1100.00*	1500.00*	*15000.*	970.00*	2100.00*	4400.00*	380.00*	480.00*	450.00*	2000.00*
MAGNESIUM DISS	MG/L	4.20	4.40	2.80	3.20	1.90	5.40	5.00	4.20	5.00	5.00
MANGANESE TOTAL	UG/L	650.00*	570.00*	440.00*	490.00*	260.00*	280.00*	1400.00*	1200.00*	1400.00*	1400.00*
NITR. NO2 AS N TOTAL	MG/L	0.03	0.02			0.01					
NITR. NO3 AS N TOTAL	MG/L	8.20	9.30			3.80					
NITROGEN NH4 ASN TOT	MG/L	0.08	0.05	0.77	1.90	0.21	0.00	1.80	1.30	2.20	1.54
NITROGEN NO2 ASN DIS	MG/L	0.02	0.02	0.01	< 0.01	0.01	0.02	0.02	0.00	0.03	0.02
NITROGEN NO3 ASN DIS	MG/L	5.30	7.20	12.50	13.50	2.90	10.50	9.80	9.30	17.00	17.30
NITROGEN TOT AS N	MG/L	8.40	9.40			4.10					
NITROGEN TOT ORG N	MG/L	0.12	0.03	0.07	1.18	0.04	1.70	2.10	2.10	1.20	0.70
NITROGEN TOTKJD AS N	MG/L	0.20	0.08	0.84	3.08	0.25	1.70	3.90	3.40	3.40	2.24
NO2 + NO3 AS N TOT	MG/L	8.20	9.30			3.80					
NO2+NO3 AS N DISS	MG/L	5.30	7.20			2.90					
OXYGEN DISSOLVED	MG/L			1.30	0.70		1.80	0.20		1.70	0.50
PH FIELD		5.65	5.70	5.70	5.70	5.80	6.10	6.30	5.75	5.50	5.50
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.01	0.00			0.01					
PHOSPHORUS TOT AS P	MG/L	0.03	0.05	0.12	0.01	0.02	< 0.01	0.10	0.23	0.19	0.03
POTASSIUM DISS	MG/L	6.40	6.30	4.90	4.90	3.00	3.60	7.40	5.40	6.60	6.40
RESIDUE DIS CALC SUM	MG/L	175.00	182.00	126.00	115.00	110.00	146.00	175.00	160.00	164.00	172.00
SILICA DISSOLVED	MG/L	15.00	15.00	7.70	8.40	7.10	7.30	12.00	8.70	12.00	13.00
SODIUM DISS	MG/L	23.00	23.00	27.00	26.00	21.00	24.00	28.00	21.00	26.00	27.00
SP. CONDUCTANCE FLD		302.00	300.00	260.00	267.00	160.00	340.00	350.00	410.00	370.00	390.00
SULFATE DISS	MG/L	48.00	45.00	27.00	23.00	26.00	18.00	58.00	56.00	54.00	57.00
WATER TEMP (DEG C)		13.00	14.00	13.50	13.50	14.00	13.00	14.50	13.50	14.00	13.50
DEPTH TO WATER	FT	84.82	85.05	29.90	29.26	30.16	30.14	22.50	20.80	20.00	20.70

CONSTITUENT		N 9057	N 9057	N 9059	N 9059	N 9059	N 9059	N 9077	N 9077	N 9077	N 9077
		76 622	76 913	741210	76 623	76 626	76 920	75 718	76 129	76 319	76 622
ALK, TOT (AS CACO3)	MG/L	16.00	17.00	21.00	15.00		14.00	8.00	8.00	10.00	13.00
BICARBONATE	MG/L	20.00	21.00	26.00	18.00		17.00	10.00	10.00	12.00	16.00
CALCIUM DISS	MG/L	26.00	26.00	31.00	37.00		34.00	21.00	20.00	21.00	21.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	28.00	27.00	53.00	180.00		180.00	37.00	37.00	38.00	36.00
DETERGENTS (MBAS)	MG/L	0.20	0.27	0.10	0.00		0.12	0.14	0.12	0.16	0.10
FLUORIDE DISS	MG/L	0.10	0.00	0.10	0.10		0.10	0.00	0.00	0.00	0.10
HARDNESS NONCARB	MG/L	69.00	68.00	110.00	140.00		120.00	57.00	52.00	56.00	52.00
HARDNESS TOTAL	MG/L	86.00	86.00	130.00	150.00		140.00	66.00	60.00	66.00	65.00
IRON DISSOLVED	UG/L	910.00	440.00		6500.00		9600.00		120.00	490.00	250.00
IRON TOTAL	UG/L	1500.00*	840.00*	4200.00*	6600.00*		9500.00*	2100.00*	7600.00*	5600.00*	4800.00*
MAGNESIUM DISS	MG/L	5.00	5.00	12.00	14.00		13.00	3.20	2.50	3.20	3.00
MANGANESE TOTAL	UG/L	1400.00*	1400.00*	250.00*	70.00*		100.00*	1000.00*	1200.00*	1000.00*	990.00*
NITR. NO2 AS N TOTAL	MG/L	0.04		0.04	0.01						0.01
NITR. NO3 AS N TOTAL	MG/L	16.00		6.90	4.60						9.90
NITROGEN NH4 ASN TOT	MG/L	2.20	2.52	0.07	0.09		0.00	1.20	0.91	2.17	0.80
NITROGEN NO2 ASN DIS	MG/L	0.06	0.04	0.01	0.01		0.01	< 0.01	< 0.01	< 0.01	0.01
NITROGEN NO3 ASN DIS	MG/L	16.00	17.70	6.90	4.60		5.00	13.40	12.50	12.50	10.00
NITROGEN TOT AS N	MG/L	18.00		7.10	4.80						11.00
NITROGEN TOT ORG N	MG/L	0.00	2.24	0.09	0.14		0.00	1.40	0.21	2.03	0.30
NITROGEN TOTKJD AS N	MG/L	2.20	4.76	0.16	0.23		0.00	2.60	1.12	4.20	1.10
NO2 + NO3 AS N TOT	MG/L	16.00*		6.90	4.60						9.90
NO2+NO3 AS N DISS	MG/L	16.00		6.90	4.60						10.00
OXYGEN DISSOLVED	MG/L		0.60	0.07				0.85	0.80	0.70	
PH FIELD		5.60	5.70	6.80	5.70		6.20	5.35	5.10	5.30	5.30
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.01		0.01	0.00						0.00
PHOSPHORUS TOT AS P	MG/L	0.02	0.11	0.01	0.04		0.01	2.90	0.14	0.03	0.07
POTASSIUM DISS	MG/L	6.60	6.70	3.00	3.80		3.70	6.40	5.90	5.80	6.20
RESIDUE DIS CALC SUM	MG/L	242.00	172.00	241.00	394.00		368.00	157.00	156.00	161.00	205.00
SILICA DISSOLVED	MG/L	13.00	13.00	11.00	11.00		11.00	11.00	12.00	12.00	12.00
SODIUM DISS	MG/L	27.00	27.00	14.00	71.00		68.00	30.00	31.00	32.00	30.00
SP. CONDUCTANCE FLD		335.00	440.00	390.00	665.00		440.00	370.00	320.00	335.00	298.00
SULFATE DISS	MG/L	55.00	56.00	64.00	41.00		40.00	43.00	43.00	43.00	44.00
WATER TEMP (DEG C)		14.00	13.00	11.00	12.00		15.00	14.50	13.50	13.00	14.00
DEPTH TO WATER	FT	21.87	22.00	140.10	140.30	140.30	140.10	19.20	18.20	18.75	20.33

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)									
		N 9077	N 9079	N 9079	N 9079	N 9079	N 9089	N 9089	S 29778	S 29778	S 29778
		76 913	76 130	76 319	76 622	76 915	76 623	76 915	67 411	67 421	721011
ALK, TOT (AS CACO3)	MG/L	15.00	7.00	7.00	13.00	14.00	15.00	17.00	4.00	4.00	13.00
BICARBONATE	MG/L	18.00	9.00	9.00	16.00	17.00	18.00	21.00	5.00	5.00	16.00
CALCIUM DISS	MG/L	21.00	16.00	19.00	18.00	20.00	12.00	13.00	4.80	7.80	7.40
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	36.00	14.00	12.00	9.60	13.00	15.00	16.00	12.00	18.00	23.00
DETERGENTS (MBAS)	MG/L	0.20	0.12		0.10		0.20	0.16		0.10	0.07
FLUORIDE DISS	MG/L	0.00	0.00	0.00	0.10	0.10	0.10	0.10	0.00	0.10	0.00
HARDNESS NONCARB	MG/L	50.00	45.00	54.00	45.00	52.00	35.00	37.00	16.00	53.00	38.00
HARDNESS TOTAL	MG/L	65.00	52.00	62.00	58.00	66.00	50.00	55.00	20.00	57.00	51.00
IRON DISSOLVED	UG/L	550.00	290.00	280.00	980.00	500.00	1900.00	1800.00			
IRON TOTAL	UG/L	*11000.*	980.00*	4800.00*	2600.00*	1300.00*	2100.00*	2500.00*	30.00*		60.00*
MAGNESIUM DISS	MG/L	3.00	3.00	3.50	3.20	3.80	4.90	5.40	1.80	9.10	7.80
MANGANESE TOTAL	UG/L	970.00*	350.00*	360.00*	340.00*	400.00*	750.00*	530.00*	50.00*		50.00*
NITR. NO2 AS N TOTAL	MG/L				0.01		0.01				
NITR. NO3 AS N TOTAL	MG/L				6.30		16.00				
NITROGEN NH4 ASN TOT	MG/L	0.00	0.00	0.14	0.05	0.00	0.06	< 0.10			
NITROGEN NO2 ASN DIS	MG/L	< 0.01	0.01	< 0.01	0.01	< 0.01	0.01	10.00			0.01
NITROGEN NO3 ASN DIS	MG/L	11.00	9.50	11.70	5.10	13.40	16.00	0.00		10.00	6.30
NITROGEN TOT AS N	MG/L				6.30		16.00				
NITROGEN TOT ORG N	MG/L	0.00	0.56	0.70	0.00	1.40	0.00	0.00			0.18
NITROGEN TOTKJD AS N	MG/L	0.00	0.56	0.54	0.00	1.40	0.00	0.00			
NO2 + NO3 AS N TOT	MG/L				6.30		16.00*				
NO2+NO3 AS N DISS	MG/L				5.10		16.00				
OXYGEN DISSOLVED	MG/L	0.50	1.40	1.50		3.00					
PH FIELD		5.80	5.10	5.30	5.30	5.60	5.20	5.90	6.00	5.50	6.70
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L				0.01		0.03				
PHOSPHORUS TOT AS P	MG/L	0.05	0.36	0.08	0.02	0.00	0.03	0.90			0.00
POTASSIUM DISS	MG/L	5.80	3.60	3.90	4.00	4.30	1.90	1.90	0.90	0.90	1.20
RESIDUE DIS CALC SUM	MG/L	160.00	82.00	88.00	121.00	106.00	139.00	74.00	31.00	109.00	94.00
SILICA DISSOLVED	MG/L	12.00	8.80	9.00	9.40	9.30	8.10	8.20	1.00	7.10	7.10
SODIUM DISS	MG/L	30.00	7.90	8.00	8.70	12.00	15.00	17.00	7.50	10.00	9.30
SP. CONDUCTANCE FLD		380.00	170.00	190.00	235.00	265.00	187.00	250.00	91.00	193.00	169.00
SULFATE DISS	MG/L	43.00	24.00	28.00	37.00	35.00	0.60	0.00	0.40	8.10	1.20
WATER TEMP (DEG C)		13.00	13.50	14.50	13.00	15.50	14.00	13.00	10.33		11.00
DEPTH TO WATER	FT	21.20	41.00	40.60	41.85	42.30	86.04	86.65			

CONSTITUENT		S 29778	S 29778	S 29778	S 29778	S 29778	S 29778	S 29778	S 29778	S 29778	S 29778
		74 920	75 912	751111	751216	76 116	76 210	76 312	76 4 9	76 511	76 6 8
ALK, TOT (AS CACO3)	MG/L	14.00	23.00	20.00	25.00	18.00	34.00	15.00	13.00	15.00	17.00
BICARBONATE	MG/L	16.00	28.00	24.00	31.00	22.00	41.00	18.00	16.00	18.00	21.00
CALCIUM DISS	MG/L	6.50	14.00	17.00	15.00	13.00	15.00	13.00	12.00	13.00	13.00
CARBONATE	MG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CHLORIDE DISS	MG/L	19.00	13.00	15.00	14.00	15.00	14.00	15.00	14.00	13.00	11.00
DETERGENTS (MBAS)	MG/L	0.10					0.20				0.10
FLUORIDE DISS	MG/L	0.10	0.10	0.10	0.00	0.10	0.10	0.10	0.00	0.00	0.00
HARDNESS NONCARB	MG/L	33.00	61.00	64.00	61.00	76.00	61.00	71.00	66.00	71.00	73.00
HARDNESS TOTAL	MG/L	47.00	84.00	84.00	87.00	94.00	95.00	86.00	79.00	86.00	90.00
IRON DISSOLVED	UG/L			30.00	30.00	30.00	30.00	50.00	20.00	20.00	30.00
IRON TOTAL	UG/L	0.00	480.00*	100.00*	250.00*	220.00*	1000.00*	120.00*	80.00*	120.00*	470.00*
MAGNESIUM DISS	MG/L	7.40	12.00	10.00	12.00	15.00	14.00	13.00	12.00	13.00	14.00
MANGANESE TOTAL	UG/L	80.00*	40.00*	40.00*	50.00*	40.00*	60.00*	50.00*	40.00*	50.00*	40.00*
NITR. NO2 AS N TOTAL	MG/L	0.00					0.03				0.03
NITR. NO3 AS N TOTAL	MG/L	5.20					20.00				22.00
NITROGEN NH4 ASN TOT	MG/L	0.05					0.05				0.01
NITROGEN NO2 ASN DIS	MG/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.07	0.00
NITROGEN NO3 ASN DIS	MG/L	6.70	19.00	15.00	19.00	21.00	20.00	15.00	0.95	21.00	19.00
NITROGEN TOT AS N	MG/L	5.30					20.00				22.00
NITROGEN TOT ORG N	MG/L	0.04					0.16				0.04
NITROGEN TOTKJD AS N	MG/L	0.09					0.21				0.05
NO2 + NO3 AS N TOT	MG/L	5.20					20.00*				22.00*
NO2+NO3 AS N DISS	MG/L	6.70	19.00	15.00	19.00	21.00	20.00	15.00	1.00	21.00	19.00
OXYGEN DISSOLVED	MG/L	8.40									
PH FIELD		5.20	6.40	6.10	6.35	5.70	5.50	6.10	5.90	5.80	5.90
PHENOLS	UG/L										
PHOS ORTHO TOT AS P	MG/L	0.00					0.01				0.01
PHOSPHORUS TOT AS P	MG/L	0.00					0.03				0.01
POTASSIUM DISS	MG/L	1.20	1.90	1.80	2.00	2.00	1.80	1.90	1.80	1.80	1.80
RESIDUE DIS CALC SUM	MG/L	88.00	155.00	139.00	161.00	168.00	172.00	136.00	69.00	158.00	151.00
SILICA DISSOLVED	MG/L	7.00	7.10	7.00	7.30	7.20	7.10	7.30	7.20	7.30	7.50
SODIUM DISS	MG/L	8.50	6.50	6.90	7.50	7.20	7.60	7.30	7.40	7.40	7.10
SP. CONDUCTANCE FLD		155.00	240.00	235.00	270.00	250.00	250.00	230.00	230.00	205.00	215.00
SULFATE DISS	MG/L	0.00	2.60	2.50	4.10	4.40	4.10	3.30	2.30	0.80	1.80
WATER TEMP (DEG C)		13.00	12.00	13.20	11.00	11.00	12.00	10.50	10.00	14.00	11.00
DEPTH TO WATER	FT			114.50	114.40	114.00	113.80	113.50	113.20	113.10	113.10

* Exceeds drinking-water standards.

Appendix 1.--Chemical analyses of water from water-table aquifer during 1974-77 (Continued)

CONSTITUENT		Local well numbers and date (yr, mo, day)		
		S 29778	S 29778	S 29778
		76 713	76 8 2	76 9 1
ALK. TOT (AS CACO3)	MG/L	15.00	16.00	16.00
BICARBONATE	MG/L	18.00	19.00	19.00
CALCIUM DISS	MG/L	16.00	16.00	14.00
CARBONATE	MG/L	0.00	0.00	0.00
CHLORIDE DISS	MG/L	16.00	12.00	12.00
DETERGENTS (MBAS)	MG/L			0.20
FLUORIDE DISS	MG/L	0.00	0.00	0.00
HARDNESS NONCARB	MG/L	83.00	82.00	73.00
HARDNESS TOTAL	MG/L	98.00	98.00	88.00
IRON DISSOLVED	UG/L	30.00	60.00	70.00
IRON TOTAL	UG/L	70.00*	140.00*	120.00*
MAGNESIUM DISS	MG/L	14.00	14.00	13.00
MANGANESE TOTAL	UG/L	40.00*	40.00*	40.00*
NITR. NO2 AS N TOTAL	MG/L			0.01
NITR. NO3 AS N TOTAL	MG/L			21.00
NITROGEN NH4 ASN TOT	MG/L			0.02
NITROGEN NO2 ASN DIS	MG/L	0.01	0.01	0.01
NITROGEN NO3 ASN DIS	MG/L	22.00	22.00	17.00
NITROGEN TOT AS N	MG/L			21.00
NITROGEN TOT ORG N	MG/L			0.00
NITROGEN TOTKJD AS N	MG/L			0.00
NO2 + NO3 AS N TOT	MG/L			21.00*
NO2+NO3 AS N DISS	MG/L	22.00	22.00	17.00
OXYGEN DISSOLVED	MG/L			
PH FIELD		5.75	5.90	6.10
PHENOLS	UG/L			
PHOS ORTHO TOT AS P	MG/L			0.01
PHOSPHORUS TOT AS P	MG/L			0.01
POTASSIUM DISS	MG/L	2.10	1.80	1.80
RESIDUE DIS CALC SUM	MG/L	172.00	166.00	143.00
SILICA DISSOLVED	MG/L	7.50	7.40	7.50
SODIUM DISS	MG/L	7.60	7.10	6.60
SP. CONDUCTANCE FLD		280.00	250.00	250.00
SULFATE DISS	MG/L	2.70	1.30	3.50
WATER TEMP (DEG C)		12.00	12.00	12.00
DEPTH TO WATER	FT	113.30	113.60	113.50

* Exceeds drinking-water standards.

APPENDIX 2

Trace-metal analyses of water from water-table aquifer during 1971-74.

Appendix 2.--Trace metal analyses of water from water-table aquifer during 1971-74

Constituent		Local well numbers and date (yr, mo, day)									
		N 1160	N 1164	N 1165	N 1167	N 1168	N 1176	N 1176	N 1176	N 1183	N 1194
		76 116	75 711	76 5 3	75 711	76 5 3	751023	76 121	76 312	75 710	751215
ALUMINUM, TOTAL	UG/L	20.00	10.00	20.00	10.00	20.00	3200.00	900.00	0.00	10.00	30.00
ARSENIC, TOTAL	UG/L	0.00	0.00	1.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00
BARIUM, TOTAL	UG/L	0.00	100.00	10.00	100.00	10.00	0.00	0.00	0.00	0.00	0.00
BERYLLIUM, TOTAL	UG/L		0.00		0.00					0.00	
BORON, TOTAL	UG/L		60.00		40.00					110.00	
CADMIUM, TOTAL	UG/L	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00
CHROMIUM, TOTAL	UG/L	< 10.00	0.00	10.00	0.00	< 10.00	10.00	10.00	0.00	10.00	< 10.00
COBALT, TOTAL	UG/L	0.00	0.00	2.00	1.00	2.00	3.00	0.00	0.00	0.00	2.00
COPPER, TOTAL	UG/L	0.00	20.00	0.00	0.00	0.00	150.00	100.00	20.00	80.00	10.00
LEAD, TOTAL	UG/L	6.00	8.00	5.00	6.00	6.00	100.00	41.00	3.00	10.00	8.00
LITHIUM, TOTAL	UG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MOLYBDENUM, TOTAL	UG/L	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	1.00
NICKEL, TOTAL	UG/L	8.00	10.00	2.00	0.00	1.00	20.00	7.00	3.00	0.00	6.00
SELENIUM, TOTAL	UG/L	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
SILVER, TOTAL	UG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STRONTIUM, TOTAL	UG/L	10.00	90.00	110.00	130.00	100.00	30.00	60.00	10.00	50.00	370.00
ZINC, TOTAL	UG/L	10.00	860.00	1000.00	20.00	500.00	320.00	170.00	120.00	2300.00	100.00

Constituent		N 1197	N 1201	N 1202A	N 1220A	N 1232	N 1235	N 1240	N 1250	N 1251	N 1252
		76 130	76 5 4	75 731	75 730	76 130	75 731	75 729	75 724	76 5 4	75 724
ALUMINUM, TOTAL	UG/L	140.00	20.00	20.00	30.00	160.00	70.00	20.00	30.00	20.00	30.00
ARSENIC, TOTAL	UG/L	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
BARIUM, TOTAL	UG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BERYLLIUM, TOTAL	UG/L			0.00	0.00		0.00	0.00	0.00		0.00
BORON, TOTAL	UG/L			160.00	160.00		10.00	20.00	190.00		70.00
CADMIUM, TOTAL	UG/L	1.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
CHROMIUM, TOTAL	UG/L	10.00	10.00	10.00	< 10.00	10.00	10.00	< 10.00	0.00	20.00	0.00
COBALT, TOTAL	UG/L	0.00	1.00	0.00	0.00	2.00	2.00	0.00	0.00	1.00	0.00
COPPER, TOTAL	UG/L	10.00	0.00	20.00	80.00	10.00	50.00	10.00	10.00	0.00	0.00
LEAD, TOTAL	UG/L	8.00	2.00	28.00	11.00	9.00	44.00	0.00	4.00	4.00	6.00
LITHIUM, TOTAL	UG/L	0.00	0.00	10.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00
MOLYBDENUM, TOTAL	UG/L	0.00	2.00	0.00	0.00	1.00	0.00	0.00	1.00	2.00	1.00
NICKEL, TOTAL	UG/L	7.00	1.00	15.00	0.00	0.00	8.00	0.00	35.00	2.00	4.00
SELENIUM, TOTAL	UG/L	0.00	0.00	1.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00
SILVER, TOTAL	UG/L	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STRONTIUM, TOTAL	UG/L	90.00	50.00	70.00	80.00	40.00	30.00	170.00	90.00	60.00	90.00
ZINC, TOTAL	UG/L	20.00	290.00	250.00	140.00	110.00	170.00	90.00	210.00	330.00	210.00

Constituent		Local well numbers and date (yr, mo, day)									
		N 1254	N 7397	N 7450	N 8235	N 8598	N 8649	N 8669	N 8848	N 8888	N 8984
		75 729	75 716	76 621	76 5 5	76 5 3	75 731	76 5 4	75 729	751023	76 128
ALUMINUM, TOTAL	UG/L	30.00	110.00	0.00	30.00	20.00	110.00	320.00	20.00	30.00	0.00
ARSENIC, TOTAL	UG/L	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BARIUM, TOTAL	UG/L	0.00	0.00	0.00	0.00	100.00	0.00	100.00	100.00	0.00	100.00
BERYLLIUM, TOTAL	UG/L	0.00	0.00				0.00		0.00		
BORON, TOTAL	UG/L	60.00	0.00				0.00		120.00		
CADMIUM, TOTAL	UG/L	0.00	2.00	1.00	0.00	1.00	0.00	0.00	0.00	8.00	1.00
CHROMIUM, TOTAL	UG/L	< 10.00	0.00	< 10.00	< 10.00	10.00	< 10.00	< 10.00	< 10.00	10.00	< 10.00
COBALT, TOTAL	UG/L	0.00	2.00	2.00	0.00	2.00	0.00	1.00	0.00	11.00	1.00
COPPER, TOTAL	UG/L	10.00	20.00	10.00	10.00	0.00	10.00	0.00	0.00	50.00	40.00
LEAD, TOTAL	UG/L	3.00	4.00	6.00	9.00	25.00	12.00	0.00	2.00	11.00	17.00
LITHIUM, TOTAL	UG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00
MOLYBDENUM, TOTAL	UG/L	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	2.00	0.00
NICKEL, TOTAL	UG/L	8.00	0.00	5.00	1.00	1.00	11.00	2.00	6.00	16.00	9.00
SELENIUM, TOTAL	UG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SILVER, TOTAL	UG/L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STRONTIUM, TOTAL	UG/L	70.00	20.00	100.00	110.00	80.00	10.00	120.00	180.00	170.00	80.00
ZINC, TOTAL	UG/L	120.00	50.00	130.00	40.00	1800.00	20.00	30.00	220.00	910.00	1000.00

Constituent		N 8984	N 9059	N 9077	N 9079	N 9089	S 29778
		76 319	76 623	75 718	76 130	76 623	76 116
ALUMINUM, TOTAL	UG/L		10.00	1300.00	10.00	20.00	50.00
ARSENIC, TOTAL	UG/L		4.00	1.00	0.00	0.00	0.00
BARIUM, TOTAL	UG/L		200.00	200.00	0.00	100.00	200.00
BERYLLIUM, TOTAL	UG/L			0.00			
BORON, TOTAL	UG/L			180.00			
CADMIUM, TOTAL	UG/L		0.00	2.00	1.00	0.00	4.00
CHROMIUM, TOTAL	UG/L		10.00	10.00	10.00	10.00	< 10.00
COBALT, TOTAL	UG/L		2.00	2.00	1.00	9.00	1.00
COPPER, TOTAL	UG/L		10.00	10.00	0.00	0.00	10.00
LEAD, TOTAL	UG/L		1.00	4.00	7.00	4.00	23.00
LITHIUM, TOTAL	UG/L		0.00	0.00	0.00	0.00	0.00
MOLYBDENUM, TOTAL	UG/L		0.00	0.00	0.00	0.00	0.00
NICKEL, TOTAL	UG/L		10.00	4.00	32.00	10.00	14.00
SELENIUM, TOTAL	UG/L		0.00	0.00	0.00	0.00	0.00
SILVER, TOTAL	UG/L		0.00	0.00	1.00	0.00	0.00
STRONTIUM, TOTAL	UG/L		400.00	80.00	70.00	110.00	110.00
ZINC, TOTAL	UG/L	220.00	30.00	50.00	20.00	90.00	6200.00